PESTICIDES ADVISORY BOARD

PROCEEDINGS OF PUBLIC HEARING

CONSEIL CONSULTATIF DES PESTICIDES

COMPTE-RENDU DE L'AUDIENCE PUBLIQUE

Woodstock, N.B.

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Secretarial note: Due to technical problems, sections of the recording tapes were unintelligible. The transcript has been produced as faithfully as possible.

Note de la rédaction: En raison de difficultés techniques, on n'a pu comprendre certaines parties de l'enregistrement de l'audience. On reproduit ici le compte-rendu aussi fidèlement que possible.

CHAIRMAN: Welcome to this meeting of the Pesticides Advisory Board. Before we start, I'd like to outline a few procedural items with regard to this meeting. The intent of this meeting is to provide members of the public with an opportunity to express their opinion on any aspect with regards to pesticides. That would include the way pesticides are used, the way pesticides are disposed of, etc.

The agenda as prepared this evening shows that we have seven presenters. I'd like you to keep in mind that this presentation is for the public, and we welcome those from the floor to make a presentation, even if you're not on the list. If you wish to make a presentation, you can contact the clerk who is sitting here in the front row, perhaps at coffee-break time. Full transcripts of this evening's hearings will be made available to the Minister of Municipal Affairs and Environment. In order to ensure that these transcripts are as accurate as possible, I'd like to ask the presenters, when they're making their presentation, to use the microphone set up here in the front, please. I would wish them to state their name and the association that they are affiliated with.

The members of the Pesticides Advisory Board are here to listen. They may wish to ask questions on points of clarification with any presentation. They are not here to state their opinions nor to be involved in any discourse or discussion with members of the audience.

I would now like to take this opportunity to introduce to you the members of the Pesticides Advisory Board. I'm sure you're all aware that there have been a number of name changes with various departments, so if you'll bear with me, I'll try to remember what all these changes are.

On my far left is Steve Hoyt, he's a forester with the Department of Forests, Mines and Energy. To his right is Mr. Michael Sprague, he's a biologist with the Department of Municipal Affairs and Environment. Next is Kirk Gordon, environmental planner with the Department of Municipal Affairs and Environment. And to my immediate left is Bandu Imbulgoda, an occupational hygienist with the Occupational Health and Safety Commission. On my far right is David Finnamore, an entomologist with the Department of Agriculture and Rural Development, beside him is Sandy Perley, also with the Department of Agriculture and Rural Development, and he is a plant pathologist.

To his left is Norm Prentice, a wildlife biologist with the Department of Forests, Mines and Energy, and on my right is Dr. Dave Walters, who is a director of public health with the Department of Health and Community Services. My name is Ken Browne, I'm a biologist with the Department of Municipal Affairs and Environment.

As previously mentioned, the members of the Board are here to listen to your presentations, and to understand the content of the presentations, they will be afforded the opportunity to ask questions of the presenter. If time permits, and if the presenter agrees, then I will call questions from the floor as well. I wish to bring to your attention that this is a non-smoking area. I ask members of the media to carry out their tasks so as not to interfere with the presentations, and if they wish to conduct interviews, that they do so either at coffee break or outside this room.

I would like the people whose names appear on the agenda to identify themselves to the clerk if they have not already done so, and anyone else who wishes to make a presentation as well, get in touch with the clerk. Are there any questions regarding the format of this hearing? If not, then I'd like to call on the first presenter, Cathy Richards. Are you ready?

If you have copies of your presentations perhaps you could leave them with the clerk and he could deliver them to the front.

CATHY RICHARDS, CONCERNED PARENTS GROUP

My name is Cathy Richards and I'm here on behalf of the Concerned Parents Group of which I have been President for the past 2 years. The Group was formed nearly 10 years ago because of public concern about health hazards associated with exposure to chemical pesticides.

The official goal of the Concerned Parents Group is to achieve adequate safeguards to human health against the risk imposed by the aerial application of chemical pesticides. In trying to achieve this goal, Concerned Parents has appeared before each hearing of your Board. This is our eighth brief to the Pesticides Advisory Board. We have tried to raise issues and suggest solutions. We hope that our efforts have not been and will not be in vain. We still have the concerns we have brought to you in the past and we reaffirm the recommendations made in previous briefs by the Concerned Parents Group.

The present brief is meant to supplement not replace our past presentations. This presentation deals briefly with three topics: immunotoxicity and pesticides, permit procedures and public information, and the role of the Pesticides Advisory Board.

On the topic of immunotoxicity. Traditional toxicology bases this evaluation of a chemical on a classic dose-response relationship whereby the higher the dose the greater the toxicity. This traditional method serves well in describing the acute toxicity of a pesticide and there is a strong tendency to dismiss any research findings where a classic dose-response relationship is not found.

This tendency may prove to be a dangerous one, however, because there is growing evidence that more complicated responses such as those which take place in the immune system, for example, may show bi-phasic or even poly-phasic patterns of response to certain chemicals. For example, new research on immunal suppression at the Centre for Environmental Toxicology at the University of Wisconsin has found the norm classic dose response in mice given very low doses of aldicarb (which is the active ingredient of Temik) in their drinking water for periods of 14 days or 34 days. The concentrations used were from 1 ppb to 1 ppm, well below the amounts that would cause acute toxicity.

The scientists found that when the animals were challenged with sheep red blood cells (SRBC) their immune responses were significantly lower than those of mice fed plain drinking water. They were surprised to find that the very lowest amounts of aldicarb in drinking water produced the greatest reduction in antibody forming cells (at 10 ppb, 46% of normal; at 1 ppb, 38% of normal).

These results call into question the traditional reliance on a classic dose-response curve in assessing immunotoxicity. On a practical basis, these results seriously question the assumption that very small amounts of a pesticide in drinking water are always safer than larger amounts.

Our interest in immunotoxicity research stems from research on Reye's Syndrome, a rare illness occurring in children whose immune responses are apparently compromised in some way. Research in the 1970's raised the suspicion that chemicals used in budworm spraying have the ability to alter the response of animals to virus infection, and to enhance virus growth in cell cultures.

Matacil, fenitrothion, carbaryl, and the emulsifiers Toximul and Atlox all showed the ability to produce increased growth of viruses in cell cultures, although the dose-response curve of the fenitrothion-treated cells was not a classic one.

The response of government and industry scientists has generally been to disregard immunotoxicity. In Maine, when a research group found that the insecticide used in Maine's budworm spray program, carbaryl, caused the chickenpox virus to grow more in cultures of embryonic human lung cells, a Union Carbide scientist Joshua Weeks dismissed the research because it was not done in whole animals. He said:

> "Since tissue cultures lack the mediating influence of many normal metabolic processes, and the natural immune system responses which occur in live organisms, they cannot be directly compared." (Austin, 1980)

Similarly, in response to the finding that Matacil more than doubled virus growth in cell cultures, Dr. George Becking, chief of Environmental and Occupational Toxicology with the federal government's Health Protection Branch, wrote:

> "Virus enhancement in tissue culture is scientifically interesting, but not proof of a cause and effect relationship between virus diseases in man and pesticides."
> (Becking, June 18, 1979)

In a 1983 report to Forest Protection Limited on the assessment of the potential of emulsifiers and solvents to enhance viral infection in cultured cells, Dr. Donald Ecobichon and Dr. Len Ritter wrote:

> "It is a fundamental tenet of scientific research (Federal Register Dec.22, 1978) that failure to achieve dose response with increasing chemical concentration to the level of cytotoxicity may cast serious doubt on the utility of such data."
> (Ecobichon&Ritter,1983,p.5)

Agriculture Canada's various trade memoranda on registration of pesticides do not include requirements for studies on the immunotoxocity of either active ingredients, additives, or formulated products. The American Environmental Protection Association, on whom Canada relies for much of its pesticide information, also does not require tests for immuno-suppression in order to register a pesticide.

Yet immuno-suppression could be a serious health hazard through increasing susceptibility to infections and prolonging the period of recovery. There is also growing concern about a long list of relatively modern illnesses that are thought to be the result of compromised immune systems, for e.g. AIDS, Reye's Syndrome, some types of cancer, multiple sclerosis, Guillian-Barré syndrome, haemolytic uremia syndrome, etc.

It seems to us that the effect of a pesticide on any part of the immune response should be thoroughly known before that chemical is released for use. It is particularly alarming to think that the traditional yardsticks for measuring safety may not be appropriate for all types of response to poisons, and that the advice we are given about "safety levels" of these poisons in our drinking water are based on these possibly inappropriate yardsticks.

We would therefore recommend that the Minister of Environment and Municipal Affairs should make aggressive representation to the Federal Department of Agriculture regarding the registration of pesticides to ensure than an appropriate assessment of the immuno-toxicity of all components of each pesticide product has been done before that pesticide is permitted for further use in New Brunswick. Furthermore, that an appropriate immunotoxicity assessment be made on all pesticide products that are already found in drinking water in New Brunswick for the purpose of re-evaluating the recommended permissible levels of contamination.

<u>Permit Procedures and Public Information</u>

The current practice of the provincial government and Forest Protection Limited is to designate areas for forest spraying with insecticides or herbicides without consulting the people who own the land. Private landowners in New Brunswick who do not want their land sprayed are required to make a request in writing by March 1st each year. Many a landowner has been caught unaware that his property was in a designated spray block, realizing it only when he saw the planes working over his woodland. Two years ago the Department of Natural Resources stated that they were considering changing to a system whereby landowners would have to request to have their woodlots sprayed if they so wished.

This change in policy still has not come about. The Pesticides Advisory Board could help to promote such a change for fairer treatment of private landowners by requiring that Forest Protection Limited submit with their application for a budworm spray permit documentation of requests for spraying from landowners whose land is included in the proposed spray blocks.

Fewer private landowners would be unpleasantly surprised by unexpected spray planes if the Department of Forestry were to publish reasonably legible maps of scheduled aerial applications of both insecticides and herbicides. These programs are sufficiently large that sections of maps could be reproduced in sufficient detail that landmarks can be located. The most recent budworm spray map that appeared in provincial papers lacked any detail except the largest rivers.

It was even difficult to locate the major cities in relation to the spray blocks, let alone small private woodlots. In the case of herbicides, no maps have been published at all. Since these massive spray programs are conducted at public expense and at public risk, it is only reasonable that the public should be warned of the locations and times that spraying will occur.

Role of the Pesticides Advisory Board

According to Section 6(1) of the Pesticides Control Act, the Board may recommend changes in the Act and regulations to the Minister of Environment. We would like to suggest a change in name and function of the Board which, if implemented, could result in significant reductions in the amount of chemical pesticides used in New Brunswick. The suggested change is from Pesticides Advisory Board to Pest Control Advisory Board. Similarly, the Director of Pesticides Control would become the Director of Pest Control, and the Act itself could be named the Pest Control Act.

These changes would represent a shift in focus away from an essentially regulatory role pertaining to pesticides and more toward a problem-solving approach to pest control. The Board would then be empowered to assemble and distribute information on alternative biological approaches to solving and preventing pest problems. We would recommend that the Pest Control Advisory Board include expertise in entomology with an emphasis on biological control, ecological agriculture and silviculture, and economics.

Footnotes

1. Plaque forming cells/gm of spleen; a ratio of PFCs/10^6 viable lymphocytes; white blood cell count.

   "The PFC assay determines the number of specific anti-SRCB antibody secreting plasma cells; a reduction in their numbers indicates either reduced levels of antibody and/or inability to respond to antigen challenge, i.e. SRCBs. This is a T-lymphocyte (T-cell) dependent process, hence reduced PFC levels can also indicate that T-cell related functions were affected. Other parameters also shared a general inverse dose-response, including wbc count, heart, kidney and thymus weights." (Olson et al., 1985, p.3)

2. Effect of an 18 hr. exposure to fenitrothion on the sensitivity of L-929 cell cultures to VS Virus

Compound	Concentration in PPM				
	0.10	0.25	1.0	2.5	10.0
Fenitrothion	47^{+}-2.1	49^{+}-2.0	57^{+}-6.9	127^{+}-11.8 (Leeetal.,1978)	60^{+}-2.1
Ratio of treated:control	.92	.96	1.12	2.49 (Rozee et al.,1978)	1.18

References

Austin, Phyllis. The Sevin Controversy. Maine Times, June 20, 1980.

Becking, George, Letter to Concerned Parents Group Research Committee, June 18, 1979.

Ecobichon, D.J. & Ritter, L. Assessment of the potential of emulsifiers and solvent mixtures to enhance viral infection in cultured cells. A Report to Forest Protection Limited, Fredericton, N.B. 1983.

Lee, S.H.S., Rozee, K.R. Safe, S.H., & Crocker, J.F.S. 1978. The properties of emulsifiers that enhance the replication of viruses in cell cultures. Chemosphere, 7 573-590.

Olson, L.J., Erickson, B.J., Hinsdill, R.D., Wyman, J.A., Porter, W.P., Binning, L., and Bidgood, R. Aldicarb suppression in mice: an inverse dose-response to parts per billion levels in drinking water. Paper submitted to Science, June 1985.

Rozee, K.R., Lee, S.H.S., Crocker, J.F.S., & Safe, S.H. 1978. Enhanced virus replication in mammalian cells exposed to commercial emulsifiers. Applied and Environmental Microbiology, 35(2) 297-300.

BROWNE: Thank you very much. Are there any questions from members of the Panel?

Do you have the reference of that study, the immuno-suppression, is it in the brief?

RICHARDS: Yes.

BROWNE: You make reference to maps on the spruce budworm spray program that appear in the newspapers. Are you aware that there are maps available at regional offices of the Department of Forest, Mines and Energy?

RICHARDS: Yes, I'm aware of that and also usually on the maps in the paper they say that you can see a more detailed map if you go to the Ranger's office, but I think most people don't really take the trouble to go there. I think the main thing is that if people had to ask to have their land sprayed if they wanted rather than having to ask not to have their land sprayed if they don't want it then it wouldn't be perhaps as important to have as detailed a map. If that's the way it is then people, I have called in the spring and people can't believe that they see the planes going over their houses and they didn't realize that they were near the spray block.

BROWNE: The decision was in 1985, it's my understanding that there's going to be changes in 1986.

RICHARDS: If the Board requires that people applying for a permit, I guess yes, and attach the documentation that these woodlot owners requested it and that would promote that change.

BROWNE: Are there any questions from the floor? If not, thank you very much.

One question here, sorry.

UNKNOWN: Miss Richards, I haven't read the Science paper that you quoted as a paper submitted to Science, has it not been published in Science?

RICHARDS: I have been watching Science to see it, but I haven't. The information I have is that is where it was going to be submitted and not anywhere else.

UNKNOWN: Thank you.

BROWNE: I'd now like to call on the second presenter, Ian MacDonald representing the New Brunswick Forest Products Commission.

Brief to the Pesticides Advisory Board by the New Brunswick Forest Products Commission, 18 November 1985, Community College, Woodstock, New Brunswick

MACDONALD: Mr. Chairman, I have made twenty copies of this brief (in English) available to you.

The New Brunswick Forest Products Commission appreciates the opportunity to present again this year a short brief to the New Brunswick Pesticides Advisory Board at this the eighth of the series of Public Hearings.

To reiterate, once again, this commission has an independent Chairman, two representatives from wood producers, two representatives from wood processors, one representative appointed by the Department of Agriculture and one representative appointed by the Department of Forest, Mines and Energy. At its meeting on November 6, 1985, the Commission again agreed that a presentation should be made to the Provincial Pesticides Advisory Board during this public meeting, since the forest resource is so important to the Province of New Brunswick.

This Commission again completely supports your Board's recommendations, particularly those recommendations relative to the regulated protection for all forest lands.

Practically every person in the province has been adversely affected by the decision not to adequately protect the over 1,600,000 hectares, (i.e. 4,000,000 acres) of private woodlots. The disastrous effects are becoming even more apparent each year on the 27% of the forest lands of our province represented by the private woodlot sector. In comparison: 20% of the forests are owned by the forest industrial sector; 50% is provincial crown land; and 3% is federal crown land.

While some protection against the budworm plague on private woodlots has been given during the past 6 years (1980 through 1985) the approximately one percent of the area covered by a spray program (the total protection over the 6 year period) is only a drop in the bucket and far below the protection that is really needed.

Since late in 1977, the New Brunswick Forest Products Commission has been emphasizing the need to protect all of the private woodlot sector from the budworm plague in at least the same degree that the large industrial forest lands and the crown forest lands are protected. The results of not protecting the private woodlots of New Brunswick are becoming more and more apparent each year. The private woodlot owners now see the losses that have occurred on their properties.

<u>This Commission again emphasizes the need to protect the remaining merchantable and young growth spruce and balsam fir trees.</u>

It is impossible this year, as noted in previous years, to salvage all of the merchantable trees that have been affected by the budworm. The markets this year are holding their own but still require that a high quality product be produced by New Brunswick mills in an attempt to be competitive in the market places of the world. Every effort has to be made to assure that the province of New Brunswick has a sufficient supply of softwoods to meet the long term demand of local and world markets. For this reason the need for protecting: 1) fir and spruce plantations; 2) other silviculturally treated softwood stands, and 3) merchantable softwoods, has to have the highest priority.

At the same time, research efforts to find suitable alternatives to pesticides must be continued. I again remind you of the decision, of a couple of years ago, of the Nova Scotia provincial court relative to the herbicide trial. The controlled use of pesticides and herbicides must continue.

The postulated health hazards from their use are indeed, as the Commission and other keep pointing out, insignificant in comparison to the traumatic effect on many lives as a result of unemployment and the extreme fire hazard created by budworm killed softwood stands. The Bonny River forest fire in Charlotte County a few years ago is an example of how fast a fire can spread. I still remember the smell of smoke, the sun being red for weeks, and the fear I had as a boy in Campbellton during the forest fires in that part of the province during the early 1930's. These fires developed in forests killed by the budworm plague of the 1920's.

Foresters are conservation conscious. They are endeavoring in New Brunswick to assure the sustained use of our natural resources in order to promote the public welfare for the greatest number of the public.

We have to remember, in this herbicide and pesticide debate, that our life expectancy is at its highest level ever. Cancer rates, on an age-adjusted basis, are steady or declining in every category except lung cancer. I believe, too, that infant mortality rates are currently at their lowest levels ever.

The risk issue brought forward by those opposing the use of pesticides and herbicides is not borne out by the facts. We are a healthier society today than ever before, after 45 years of necessary intensive pesticide use under controlled circumstances.

We have to remember that pesticides include the sterilants used by restaurants to meet sanitary codes and to protect you from disease. Without pesticides, for example, fast food chains would be hard pressed to stay open. These chemicals are the tools used by hospitals and doctors to provide a safe climate for providing health care.

Chlorine is used to assure safe drinking water, and it's a pesticide. Many household goods used to sterilize toilets, clean sinks or mop floors are pesticides. When it comes to battling back against hordes of disease-carrying or destructive fleas, mosquitos, ants, rats, mice or termites, it's pesticides we often turn to for help and health protection.

In short, this society depends on pesticides to assure an ever better livability. That's not to say that pesticides are without risk - we all know they're toxic. Our point is that this manageable risk is infinitesimally slight when weighed against the enormous benefits of pesticide use.

Thus, in our minds, this risk from not using pesticides needs prominence.

To conclude, once again, satisfactory protection of private woodlot forests is truly even longer overdue - one percent is far from satisfactory! You can still rely upon the New Brunswick Forest Products Commission to strongly support the decisions of the Pesticides Advisory Board and the regulated use of pesticides and herbicides.

For everyone's information, and to encourage a two way flow of communication, I attach a bilingual information sheet (dated 6, November, 1985) on the New Brunswick Forest Products Commission.

Thank you again for the opportunity to express the continued concerns of this Commission.

Yours respectfully,

J. IanMacDonald,R.P.F.
Secretary to the
New Brunswick Forest
Products Commission

BROWNE: Thank you very much. Are there any questions from the members of the Pesticides Advisory Board? Would you entertain a question from the floor? Are there any questions from the floor? If not, thank you very much. Yes, one question, I'm sorry.

Unintelligible.

BROWNE: I'd like to call on the next presenter, Mr. Keith Bowser from Fraser Incorporated.

BOWSER: Mr. Chairman, Members of the Board, Ladies and Gentlemen.

Another year has passed, and in spite of the poor turnout by contributors of submissions and the general public, and a token coverage by the media at the past two hearings, we have chosen to participate again. Our reasons are these:

- As a forest products industry and as forest land managers we have much at stake in the use of pesticides as management tools in the forest.

- We approve of this type of forum as a means for anyone to air their views in a logical manner within a semi-formal atmosphere.

To start off our submission, let me report on the use of pesticides this year on our freehold land and crown license. A total of 140,000 Ha of spruce/fir forest was treated with the insecticides Matacil and Fenitrothion for spruce budworm control (60,000 Ha on Fraser Freehold and 80,000 Ha on crown). This represents less than 20% of the total forest area managed by Fraser. The blocks chosen for treatment were selected carefully with due regard for stand condition, insect population, and risk of severe damage to 1985 growth.

No areas scheduled for harvest in the next 5 years were treated. The majority of the blocks treated were spruce/fir stands in the mature to over-mature category. Please keep in mind that the general picture in New Brunswick is that much too high a proportion of our softwood stands are in these categories and their life must be extended beyond the stage where they would normally be considered for harvest.

A total of 7,800 Ha of spruce plantation areas were treated with the herbicide ROUNDUP representing approximately 1% of the total managed area. The majority of herbicide treatment was on 1984 plantations, in blocks averaging less than 60 Ha in size. Also treated were a number of plantations established in the years 1981 to 1983, some of which were receiving a second treatment. As well, we treated some areas to be planted in 1986.

From experience we have found that in general our past treatments have been scheduled too late, and with the plantation already too much under stress. We feel that earlier intervention will reduce the need for second treatments in many cases. It should be kept in mind that our objective in spruce plantations is to bring them to a "free to grow" state and to 3/4 metre in height by year 5. This height standard is co-incidentally close to the height of an average raspberry cane on an average site.

In our case, the annual use of herbicides on plantations may have reached its peak, because our rate of establishing plantations has probably levelled off. If we can improve on our timing, and thereby reduce the number of second applications required, this will have a significant impact on total amount of herbicide used, not to mention a reduction in costs.

Speaking of costs and efficiency, at the present time we are limited to <u>one</u> and <u>only one</u> effective herbicide which is registered for aerial application in forestry use. Having only one option substantially reduces our buying power and our ability to negotiate reasonable prices. It also reduces our efficiency, because as you know, herbicides are selective, and each one has a slightly different spectrum of plant species that it affects. A second option in herbicides would enable us to better suit the treatment to the particular weed problem. There is a second option on the horizon but tantalizingly, just out of reach. It is the herbicide GARLON.

The herbicide GARLON has been licensed for use in the United States for several years. It lacks approval for aerial application for forestry use in Canada, and the final research project has been designed to establish its acceptability for licensing for this use. The story of the fate of one such research project is the source of deep frustration for a forest manager.

This particular project was to have been a cooperative one involving our federal Forest Pest Management Institute, the Pacific Forest Research Centre, the Department of Fisheries and Oceans, the B.C. Ministry of Forests, Simon Fraser University, University of British Columbia and the manufacturer, Dow Chemical Company.

The project site was chosen for its productivity, need for weed control and environmental sensitivity. (This latter was related to salmon habitat and would provide first hand technical data on the degree of impact on salmon). After all, you do not test a fire retardant in a vacuum on a non-fire. Or, as a venerable Miramichi story teller one said to me, "You can't tell a bear story if you don't have any bears in the story".

The project was planned for 1984 on the Skeena Watershed in B.C.; all participants were in agreement and both federal and provincial permits were granted by July 1984. Then Department of Fisheries retracted their approval and threatened legal action if the project proceeded. The project was postponed.

Agreement was reached again early in 1985 for a project much reduced in scope and far removed from salmon habitat. Because of the new constraints, the project changed from one of the most detailed North American experiments on environmental impact of a herbicide to one much more limited in scope and value. By August 9, 1985, all was ready to proceed. However, an organization named the COALITION FOR A PESTICIDE FREE NORTHWEST, which includes an Indian band and its membership, mounted a 'Skull and Crossbones' campaign, got media support and obtained a temporary injunction. The 'temporary' nature of the injunction was appealed by the coalition. No date was set by the judiciary for the hearing on the appeal. The project was postponed. Another year gone by.

Thus, the approval of a valuable herbicide for forestry use, which is already in wide use otherwise, has been delayed, and its future registration threatened.

Truly, this is a frustrating situation and lacks any legitimate and logical reasoning. How are we to improve our technology and ultimately our forest management when a small fragment of society is allowed to influence government regulatory bodies and some of the most reputable scientific groups in the country. We need the best tools available and their development must not be hindered in such a fashion.

Two years ago, the herbicide ROUNDUP was registered for forestry use, and already you have heard me say that we are looking forward to a reduction in the number of treatments required per plantation. This is the kind of performance we are looking for and this, I submit to you, is not only in the best interests of everyone but is much closer to responsible environmentalism than the events in the B.C. story.

What does herbicide treatment mean to users and the public at large? In extreme cases it means prevention of a complete failure of a plantation. In the common cases in our area, it means a difference of 30% in seedling loss at the beginning of a plantation and therefore, a similar volume loss at the end. It also means a difference of 5-10 years of lag time in the early development of this plantation and a similar delay in reaching maturity. Both of these result in less wealth for all of us at some point in time.

Let us now return to the subject of insecticides. We hope that it is well known by now, and recognized, that keeping the old part of our softwood forest alive as long as possible is critical to our future well-being. Achieving this objective is not without problems or side effects. In spite of our efforts, we are still losing trees because of their age and their ability to no longer cope with budworm feeding stress. The result is that the overall quality of our wood is rapidly decreasing.

Our balsam fir, like our poplar, is a short-lived tree. Internal rot sets in often at an early age in the base of the tree and spreads. If a leader is killed by feeding, rot sets in at that point and spreads, finally, immediately after a tree dies, sap rot begins in the outer layers and spreads inward. In all woods operations on everyone's land in this province, there is an element of salvage and this "salvage" results in poorer quality wood for mills.

If one were to look at the trees only, one would recommend harvesting all of it <u>now</u>. Two facts of life make this impractical. First, there is no way to use up the volume of wood <u>now</u> and secondly, if one did so, he must reconcile himself that there would be nothing for next year and for years after.

This state of affairs is most evident in the private woodlot field where there is an abundance of dead and dying trees related to lack of past protection, and coincident with a downturn in the economy and a lower demand for wood. On the manufacturing side, lower demands must always be addressed with maintaining or improving product quality, and there is no room for poorer raw material. This situation has been faced by the private woodlot owner since 1980 and is now to a lesser extent confronting both the large landowner and the crown as well.

In conclusion, I would like to repeat our thought in last year's submission that the best place to discuss the pros and cons of environmental issues is in the field while observing real life examples. On our part, we extend an invitation to any group, large or small, to visit us and do just that.

In addition, we would like to note that in July 1985 one positive step was taken to design a method of resolving environmental issues arising from dealing with pest problems in forest management. A "consensus building workshop" was held in Saint John involving a selection of people from a wide range of government agencies, environmental groups, universities, and industry. A follow up to the initial workshop is scheduled for next week. It is a certainty that we will always be confronted with pest problems in the forest and just maybe there could be some concrete steps designed that would help to avoid confrontations and misunderstandings when pest emergencies arise.

Thank you, Mr. Chairman.

Question unintelligible

BOARD MEMBER: On your budworm control program you have the insecticides Matacil and Fenitrothion and there's no mention of BT. Was BT used on any of your crown land, or your freehold or crown lands?

BOWSER: Answer unintelligible.

BOARD MEMBER: Was that your own decision or...

BOWSER: On freehold it was certainly our decision and the reason I would have to say it that we're just not comfortable enough with the performance of BT....

CHAIRMAN: Are there any questions from the floor? If not, thank you very much.

DON LOCKHART, NEW BRUNSWICK FOREST PRODUCTS ASSOCIATION

Mister Chairman, Members of the Pesticides Advisory Board- thank you for the opportunity to appear before you tonight.

The notice calling for this meeting under the authority of the Pesticides Advisory Board is delightfully vague, in that presentations are to be received " ... with respect to any matter concerning pesticides". This certainly leaves the door wide open, which undoubtedly was the intention, and a good one.

This is the seventh year that I have appeared before this Board. It may be interesting to look back for a moment. In the early years, meetings were held at two or three different locations within the province. In most instances the halls were packed to the rafters and the television crews and cameras were much in evidence. Everybody who attended was much stirred up - or appeared to be. More recently we find just the opposite situation prevailing. Numbers are very few. It would be hard to mount a corporal's guard.

One has to wonder why this situation has come about. Is there a lack of interest? Have people become old and tired and in a sense thrown up their hands and moved on to something else? I don't think so. Please let me know what I do think has happened and is happening.

We are all becoming more "couth". Now that's a word that I cannot find in most dictionaries; however if uncouth means rough, crude, unrefined, then couth surely must mean polished or refined or I do believe we have become more couth or we are couther- that is, more sophisticated about all these matters.

We know that crops - be they agricultural or forest - must be given some degree of tender loving care, or stated another way, must be managed. In this province and in every other province we have deliberately opted for the management route simply to control the pattern of development. The alternative has not been deemed to be acceptable because if we did adopt the hands-off process the forest structure would not be able to met society's needs from it. So, we say that we will get on with the management of the forest, starting with an inadequate forest, emerging 50-60 years later with an adequate forest, according to some defined criteria.

Carrying along this thought process, it becomes obvious that the managed forest which is costing many dollars to manage must be protected against fire, against insects and not allowed to become stunted or reduced in volume as a result of suppressions by prolific plants such as raspberry, alder and pin cherry. To not successfully address these management needs is just plain stupid.

An example as to what can happen when a forest resource is not protected against insect attack is only too well seen in Cape Breton. Here, as is well documented, there are between 10 million and 14 million cords of wood which are dead and virtually useless, the direct result of a monumentally foolish decision of two Nova Scotia governments to not protect the forests. Taking the lower volume figure of 10 million cords at, say $40 per cord - four hundred million dollars were wasted in raw material only - to say nothing of labour not employed and wages not paid. The figure just boggles the mind, how could people be so profligate? Fortunately New Brunswick decided many years ago that society should harvest the trees, not the insects. If the decision had been otherwise or if it should be changed, the employment picture would be grim indeed.

Two problems to be solved.

1. Setback Zones

Subsequent to federal registration, provincial regulatory agencies decide on how pesticides are to be sold and used within provincial boundaries. This often involves restricting use and may, for example, take the form of setback (no-spray) zones around designated values, e.g. human habitation, drinking water supplies.

While this is a sensible approach to pesticide regulation, its current application to herbicide use in forest is not scientifically-based, leading to serious contradictions both among and within provinces. It is not uncommon to find that setbacks imposed on the agricultural use of a pesticide are in the order of metres, while in forestry the setback for the same pesticide will be several kilometers. Setbacks are often decided arbitrarily with little scientific basis.

The significance of this is that the imposition of no-spray setbacks removes the most cost-effective technique of controlling competing vegetation and therefore casts serious doubt on the wisdom of investing in forest renewal in these setback zones. Because setbacks are often large, they have the potential to affect a large proportion of the forest land base.

In our province the provincial government imposed a 3.2 kilometre setback around all human habitation for aerial application of 2,4,5-T. When mapped, this setback affects 44% of the productive forest in the province. In other words, landowners on nearly half of the provincial forest land are denied use of the most cost-effective technique for weed control. The mechanism for determining setback zones needs an immediate overhaul.

2. Provincial Suspension

Rather than restrict how a herbicide will be used in the province, provincial regulatory agencies sometimes take the more drastic step of totally suspending the use of a pesticide. Such was the case in 1979 when Ontario, Saskatchewan and British Columbia suspended the use of 2,4,5-T. This produced the situation in which the use of 2,4,5-T is approved by the federal government and most provincial governments but is banned in three provinces. Such ambiguity across the country damages the credibility of our system of regulating pesticides in Canada and seriously erodes public confidence in the system.

A more recent phenomenon, prompted by the IBT (Industrial Biotest Laboratories) scandal, is that provincial health authorities are now demanding access to health safety data submitted in support of registration. This request comes after the pesticide has been federally registered and, because of this, the provincial review amounts to an audit of the review carried out by Health and Welfare Canada as part of the federal registration process. A recent case involved the herbicide glyphosate (ROUNDUP), which was registered federally for forestry use early in 1984.

Shortly after, the New Brunswick Department of Health requested the health safety data to review, presumably to determine whether forestry use of ROUNDUP would be permitted in New Brunswick. (Agricultural use is already permitted). Quite understandably, this request is perceived by federal officials as an audit of their work. Obviously, there is a lack of trust between federal and provincial health officials, the reasons for which are obscure. This distrust should be ended.

Through the regulatory action of suspending a federally-registered pesticide within provincial boundaries, we have created a quasi-provincial registration system. This action amounts to a regulatory barrier to accepted forest management practices and associated economic growth. It should end.

Thank you for the opportunity to present these thoughts and suggestions.

CHAIRMAN: Are there any questions from the members of the Board?

Could you entertain questions from the floor? Are there any questions from the floor? Thank you very much.

That is the next item on the agenda. Coffee. I'd like to break for 20 minutes. If we could be back here at 8:30. Those people who came in late, if you would like to make a presentation I would ask to get in touch with the clerk, who is, who must be outside, maybe he's getting coffee ready for us. If you would do that before you come back in at 8:30.

CHAIRMAN: We have on the agenda Stu Fleischhacker. Is he present? Did I pronounce that correctly?

FLEISCHHACKER: My apologies to the Panel, I've made a slight boo-boo on my way here and left all the copies of my brief at home, I took the wrong folder, but I've been advised by the clerk of your address and will send that on tomorrow. I'm presenting this brief as basically a private citizen. Just another comment I'd like to make, I'd like to have done a little more research but time has been quite limited for me.

It's clear that at some point (probably sooner rather than later), we, as a society must begin to move away from chemicals both in agriculture as well as forestry. I might state the abundant problems these practices have had (i.e. dumps, health hazards both to users and residents near affected areas, spray drift in aerial applications which find their way into watercourses, the effect on wildlife and non-target predators,etc.). However, I would like to discuss an area not usually taken into account in discussions of this type, but one which should, especially in a relatively underdeveloped area such as New Brunswick.

What I'm referring to is the drain of dollars out of the province. Virtually all of the chemical products used on our land come from elsewhere. Not only does this mean dollars being exported (which we can little afford), but loss of jobs with its multiplier effect, not the least of which directly translates into governmental income.

Let's take some examples. In the forestry industry, one of the latest uses for chemical sprays is for hardwood suppression in cut-overs. Here, the usual method is for aerial application to kill species such as pin cherry, poplar and other so-called "undesirable species" to release the more "desirable" softwoods. Studies in Oregon have been performed to assess the possibility of manually releasing the trees, for instance by using a spacing saw. In many instances, this method is quite satisfactory, though somewhat more expensive. However, taking into account all expenses (loss of dollars to the province, loss of jobs, loss of taxes, pollution of water and soils by chemicals, etc.), it seems that perhaps the economics needs to be reconsidered.

Another example from the forest industry involves site preparation for planting. Here again, for years we have used non-chemical methods, which either involved hand scarification during planting or mechanical site preparation using various machinery. We are now turning almost entirely to chemical methods... Foresters I have talked with state that in many cases, manual and mechanical methods are quite satisfactory. Again, with the added benefit of the money staying in the province.

Let's look at weed control in agricultural situations. Up until 30-40 years ago, all weeds were controlled mechanically, or by proper use of crop rotations. Such methods didn't eliminate all weeds, but usually kept weeds from becoming a problem. Again, with the added benefit of keeping dollars here to be used in the local economy. There is now a trend towards more sustainable agricultural methods, with many large farms (hundreds of acres) refraining from the use of chemicals.

Many more examples could be given, but the above should give the directions we could choose to go if the desire and incentives were there. It becomes mainly a societal decision, and whether the government leads the way or follows, changes will be inevitable given the problems we have been experiencing the last few years (environmental, loss of transfer payments, loss of personal disposable income, especially for those on the land). Thank you.

CHAIRMAN: Any questions from the Panel? Would you entertain questions from the floor? Are there any questions from the floor? If not, thank you very much.

DR. LUCY DYER, CONSERVATION COUNCIL OF NEW BRUNSWICK

The Conservation Council of New Brunswick is the province's main environmental advocacy organization. CCNB was founded in 1969 by concerned citizens to advocate policies that recognize the importance of a healthy environment. The Council is unrestricted by political or commercial considerations, and has often acted as the province's environmental conscience.

One of the objectives of the Conservation Council is to advocate environmentally appropriate remedies to our most pressing environmental problems - such as pesticide abuse and resulting groundwater contamination by pesticides and other hazardous waste. One of the activities we have undertaken in pursuance of this objective has been a series of briefs presented to the Pesticides Advisory Board at every public hearing the Board has held since its inception.

Most of these briefs have contained a number of recommendations aimed at minimizing the unavoidable risks associated with pesticide use, both to pesticide users and to innocent bystanders exposed to these dangerous chemicals through contaminated air, water or food. We feel that these recommendations should be followed, and that they remain appropriate. We are therefore re-submitting them at this time, and request that you take action on them.

Some of the recommendations for improvements in pesticide regulations and use made by the Council in previous years have been acted upon. Among these was a recommendation made in 1979 that a program of well water sampling be instituted in agricultural regions in the province, especially in the potato producing areas of Carleton and Victoria counties. (Recommendation #19, December 15, 1979 submission to the Pesticides Advisory Board).

The results of the well water testing program that was undertaken were not reassuring, and the implications of the widespread contamination of well water with pesticides and fertilizers are cause for concern for many New Brunswick residents. Approximately 65% of New Brunswickers depend on groundwater for their drinking water supplies. An even higher percentage of people in the Upper St. John River valley, including most of the communities in the region, are completely dependent on groundwater for domestic uses.

This vital resource is presently undefended by the provincial government against a sustained assault from toxic chemicals which include not only pesticides and fertilizers, but also gasoline from leaky underground storage tanks and other hazardous waste, polluting the environment and posing an invisible threat to human health. At the present time, groundwater protection appears to be low on the province's political agenda.

Recent work by the N.B. Department of Health indicates that this important resource is contaminated in the potato belt by low levels of chemical fertilizers and at least two pesticides. In a year long study of well water quality in Carleton County, all 292 wells tested for fertilizer residues contained some level of nitrates.

The presence of fertilizers would indicate that other chemicals used on farms such as pesticides could also make their way into well and ground water supplies. The chemical breakdown product of many fungicides, ethylene thiourea (ETU), was detected in 21% of wells monitored before the growing season, and in 69% while spraying was underway.

The insecticide TEMIK was detected in most wells near fields where it was used. Additional pesticides were not monitored, which means that the full extent of pesticide contamination of water is unknown. We recommend that the testing regime be expanded to include tests for more of the pesticides in common use in the province.

Scientists can make a fairly good judgement about whether or not a chemical will in the near term poison a person drinking water containing residues. However, they have great difficulties in determining the effects of long-term exposure to low levels of poisons. In many cases the risks of health effects such as birth defects, cancer, chromosome damage, alteration of the immune system, and behavioral changes are unknown.

ETU is known to induce cancer and birth defects in laboratory animals. The U.S. Environmental Protection Agency estimates that the probability of cancer resulting from a lifetime of drinking water containing 10ppb of ETU is 1 in 50,000. In the potato belt ETU has been measured at concentrations ranging from 0.1 to 55 ppb.

TEMIK may also cause mutations and may possibly cause birth defects. It has been measured in drinking water at levels ranging from 0.1 to 29 ppb.

The possibility that ETU, TEMIK, nitrates may increase the risk of birth defects is of particular concern in the potato belt. The Hatcher Task Force on Chemicals in the Environment and Reproductive Problems in New Brunswick noted that there is a high prevalence of neural tube birth defects in the upper St. John River valley relative to the rest of the province, and to other provinces. Further, they concluded that there is a strong association between these birth defects and potential exposure to agricultural chemicals.

Clearly, it is not a question of whether the drinking water in the area is safe, if safe implies absence of health risks. Rather it is a question of what level of risk exists, and how acceptable that risk is to those drinking the water.

The Department of Health is informing individuals and municipalities of the level of contamination in their water supplies, but is not making them aware of the possible health risks. Instead, it has established maximum acceptable levels of contamination.

The Department has set 100 ppb as the maximum acceptable concentration of ETU and TEMIK. There are no such guidelines anywhere else in North America. The State of New York finds any detectable level of ETU in groundwater supplies of drinking water as unacceptable. The United States Environmental Protection Agency uses 10 ppb as its advisory level for TEMIK, above which it recommends that the water not be consumed. In effect, the health department is leading people to believe that there are no health risks associated with their water supplies as long as the level of contamination is below its guidelines. Not only is this scientifically unsound, it is a denial of the potential health hazards.

There is an urgent need in this province to establish and implement legislation and policies aimed at preventing future contamination. The public wants water of the highest quality, free from any contaminants that pose unknown health risks. Groundwater resources are clearly a provincial responsibility. The need for immediate action before a more immediate and pressing threat arises is made more urgent by the very nature of groundwater.

Groundwater moves very slowly, generally in the range of 5 to 50 feet per year, so it cannot flush itself of contamination like a river, except over very long periods of time. This means that once contaminated, there is little dilution of contaminants and concentrations remain high. The sunlight, heat and microorganisms that normally act to degrade chemicals are largely absent from groundwater aquifers, which means that contaminants are slow to break down and can remain in the water for decades.

Pesticides and other chemicals can enter an aquifer and remain undetected until the chemical reaches a well and makes its presence known by altering the smell, taste, or look of the water, or by creating health problems.

The Conservation Council is making the following recommendations to protect groundwater, a vital provincial resource, from pesticides and other hazardous wastes.

Recommendations

1. The New Brunswick government must make groundwater protection a major priority. It should immediately establish a task force to study the potential sources of groundwater contamination and to propose protection strategies, such as zoning of aquifers.

2. The province should enact a safe drinking water act that would regulate the quality of water at the tap. This should be developed with public participation. Only the public can decide what level of risk is acceptable.

3. The Department of Environment is responsible for monitoring groundwater contamination, as well as enforcing pertinent regulations. Neither of these functions is adequately funded. Both the budget and manpower devoted to groundwater contamination need to be increased.

4. The province should establish a network of observation wells around New Brunswick for long-term monitoring of synthetic chemicals in groundwater.

5. Municipal water supplies should be monitored for all those synthetic chemicals having a potential for contaminating groundwater. Private wells should be tested on request.

6. In areas where contamination of groundwater has already been identified, priority testing of water supplies of people at high risk should be undertaken.

7. The Environment and Health Departments must be required to inform people whose water supply is contaminated about the potential health effects associated with each contaminant, the probability of health problems resulting from the levels present and the uncertainties that exist, and the basis on which the drinking water guidelines were established, if they exist.

8. Where the provincial government recommends that people stop using their water supply because of groundwater contamination, an alternative water supply should be supplied by the province.

9. The Pesticides Advisory Board should take steps to eliminate or reduce the use of TEMIK. If use of a substitute cannot be avoided, chemicals which have not been detected in groundwater should be used.

10. In conjunction with the federal government and the N.B. Federation of Agriculture, the provincial government should develop and promote Integrated Pest Management in New Brunswick. This systems approach to reducing pest damage and pesticide use uses techniques such as the release and enhancement of predators, parasites, and pathogens, the use of genetically resistant crops, crop rotation and intercropping, with chemical pesticides used only when necessary and appropriate. An IPM plan for potatoes should be the first priority.

11. The governments should provide financial assistance to farmers who change their methods to reduce their reliance on chemical inputs.

12. The use of fungicides which break down into ETU should be restricted.

In summary, the seriousness of the problem of groundwater contamination cannot be over-emphasized. Delays in taking action should not be tolerated. There is a need for faster action than we have seen in the past on other recommendations made to the Pesticides Advisory Board in the past.

The concluding section of this brief consists of some of the recommendations and information that have been presented to this body in the past, with little effect. We feel that they bear repeating and hope that some action with be forthcoming.

SECRETARIAL NOTE: SEE APPENDIX I FOR A PHOTOCOPY OF THESE RECOMMENDATIONS, AS SUBMITTED AT THE HEARING IN WOODSTOCK.

Thank you very much. Are there any questions from the members of the Board?

Q: You mentioned in one of the recommendations, number 1, the Task Force, any thoughts on the structure of this Task Force? What department it should fall under or who should be involved?

A: Probably the departments of Environment and possibly Health, at least, should be involved. And with some public participation. There are fairly major problems with gasolines found in groundwater, from a large number of underground storage tanks, because when they get old they do leak and this has already surfaced in some parts of the province and the problem is going to get worse so the people who are competent to deal with that problem as well.

In addition there are problems of the dump sites where toxic wastes have been disposed of and there areas where there are some dumps in which the groundwater is known to be contaminated. So I would think that this Task Force would not deal solely with pesticides but should have unintelligible.

Q: In other areas as well?

A: Experts in other areas.

Q: And you mention the topic risk assessment.

A: Right, to help decide what level of risks is acceptable. This seems to be a real problem.

Q: I believe you made reference although I don't see it written, you made reference to unintelligible something when it's over 10 ppb.

A: Where the advisory level is 10 ppb, unintelligible

Q: An offer was extended to the people in the province of New Brunswick, they wanted to use the charcoal filter but they were advised that one should not put in a charcoal filter, they also connect up a chlorinating unit along with the charcoal filter.

A: But nevertheless it does point out that Union Carbide, the manufacturer of ALDICARB and TEMIK, feels that a level 10 times less than the level New Brunswick has had is dangerous enough for them to go to the extent of providing filters.

Q: The recommendation was that the municipality, the drinking water should be tested. In Recommendation #5, I see that as probably quite expensive, is that a cost that should be borne by the citizens?

A: Well, that's a good question, in the municipalities probably gasoline and toxic wastes from the local dumps would be more of a problem than pesticides although pesticides are certainly abused within municipal boundaries as well as outside but we have not discussed as to who would be the appropriate person to fund this, but certainly I would think the province would be the only one who would have the capability of doing it at the present time. It's a very sophisticated system unintelligible

Q: The Department of Municipal Affairs or Environment may be...

A: Well, yes the Department of Environment. I would doubt that Municipal Affairs would have the equipment or the facilities at the present time and there would be no point in duplicating it.

Q: Are there any other questions from the members of the Board?

Unintelligible

Q: Would you entertain questions from the floor? Are there any questions from the floor?

Unintelligible

Gerry Comeau, Federation of Agriculture.

Chairman of the Board, members of the Panel, my name is Gerald Comeau and I work with the New Brunswick Federation of Agriculture.

When I joined the N.B. Federation of Agriculture as Assistant General Manager last August, I was told one of my major responsibilities would be to examine the pesticide question. There are many dimensions to this question, and I can say I feel up to the challenge.

The Federation of Agriculture is in a position where its farmer members are reliant on pesticides for their livelihood, which is food production. It is my job to safeguard farmers' rights to use pesticides.

Plant protection can be achieved only through a well-designed pest management program. To be competitive and to produce marketable products call for the use of pesticides in this day and age.

Since the discovery of DDT forty-five years ago, we have come a long way in agriculture in understanding how to do a better job of plant protection. This is in large measure because we had an aggressive pesticide industry and because we had practical scientists looking for a better way of doing things. We also have to recognize the contribution of responsible ecologists in forcing change. The lengthy process of banning DDT served as a catalyst to industry and agricultural scientists.

It spurred them on although there was a lot of kicking and screaming at the time.

Two years ago, I had the opportunity to return for a couple of months to the pesticide company I had left 10 years before. I worked in updating pesticide labels and registrations. This took me downstairs in the company's archives. One day I found a crop protection calendar for fruit trees dating back to the late 1940's. I wish I had this crop protection guide here to show it to you. Those of you who were in agriculture in those days would be very familiar with the pest control recommendations.

To some of you, it would be quite an eye-opener. DDT it seemed, was the answer to every problem in the apple orchard. Although there was a pretty good understanding of insect biology at the time, and spraying techniques and instructions on the labels were already quite well developed, the arsenal of chemicals was pretty limited. There were few insecticides besides DDT. Nicotine sulfate and lead arsenate were available, and in usage. Copper sulfate was the prevalent fungicide.

When I came into the industry 15 years ago, we were still in the process of doing away with DDT, mercury compounds, and arsenics. Change does not come easily, but change was in the wind. There were better and safer chemicals in the pipeline of development. Farmers, being the responsible people they are, were willing to look into new directions as long as it meant progress.

In the 1960's, the chemical industry, government regulators, and farmers seemed to be able to all work together and get things done. Research and development came first. It was really the coming of age of pest management as we know it today. Insecticides like the organophosphates and the carbamates were increasingly used over the hydrochlorides like DDT, ALDRIN, and DIELDRIN. The phenoxy herbicides of which 2-4D is probably most widely known were commonly accepted as excellent chemicals for the control of common broad leaf weeds in cereal crops at very low rates.

We gained a lot of ground 15 and 20 years ago, but progress seemed to become impeded from the beginning of the 1970's. By now, we seem to have moved from research and development to the courtroom. Troublesome issues in the pesticide industry have been festering for a long time now. Where is this going to lead us? We have very big, lethargic, sometimes obstructive governments telling us they are looking after our health and safety. The chemical industry is curtailing research activities in the pesticide field because they find it too expensive and too frustrating to convince governments to give them registrations on new chemicals.

To make matters worse, we have a new crop of professional agitators and activists masquerading around as biologists and ecologists scaring men and women in society, by using alarmist tactics. I have an old Scottish friend who says, "Don't believe anything you hear, and only half of what you see." The issues are becoming more and more muddled as more and more people jump into the fray. Where we used to have the chemical industry, governments and farmers working together, we now have increasing disarray, fighting, and bickering going on. Instead of co-operation we too often have confrontation. A mesmerized and increasingly hostile public looks on and pays the bill.

Still, it is not all doom and gloom. We are, after all, maintaining the status quo. There are enough chemicals on the market to enable farmers to do an excellent job of producing large quantities of high quality food, provided they can get a reasonable price.

At the N. B. Federation of Agriculture, we believe there is a job to do in bringing home to you the facts on pesticides. What we need to do is stop and take stock of where we are on this pesticide question, and decide on what to do next. The N. B. Federation of Agriculture has appointed a pesticide committee, which I represent. We are in the process of developing an official position for the Federation on pesticides.

For the moment, one of the things we are doing is looking at what others are doing. In Nova Scotia for instance, an organization called FANS, Forestry and Agriculture for Nova Scotians, has been formed.

FANS has given itself the task of putting pesticides in perspective to ensure farmers and foresters will continue to have the right to use them.

There are other considerations. We believe farmers should have an opportunity to learn more about crop protection through carefully structured educational settings. We believe the public should be made aware of the costs and benefits of using pesticides. We know that there is a job to do, and we need help and financial support to do it. We have initiated discussions with officials of Agriculture Canada, and we plan to have further meetings in the near future. One thing is for sure, it is our intention to aggressively defend farmer's rights to use pesticides.

Thank you.

CHAIRMAN: Are there any questions from members of the Board? Would you entertain questions from the floor? Are there any questions? Yes, we have one.

Q: Unintelligible

DAVID COZAC.

Good evening Members of the Board, and Members of the Public. My name is David Cozac, and I live in Fredericton. My wife and I own and operate a whole foods store, and this gives rise to my concern over the use of pesticides in agriculture. Since purchasing the store four years ago, we have witnessed a gradually increasing awareness by our customers of the quality of food they wish to consume. More and more people are asking for foods that are grown without the use of chemicals or synthetically produced fertilizers.

The reasons for this new awareness are several, but include, tested evidence of groundwater contamination in many of the United States and Canadian provinces, including New Brunswick; the sale of tainted products such as the TEMIK contaminated watermelons in California in July 1985; and the known use of growth hormones and antibiotics in the beef, pork, and poultry industries. In addition, we have customers referred to our store by their doctors because they are allergic to many of the chemicals used in the growing and processing of food. In particular, hyperactive children are very sensitive to additives and chemical residues found in foods, and their parents are desperately seeking alternative sources of food.

We can presently provide 17 kinds of beans, grains and seeds, 13 types of flours and cereals, 8 types of dried fruits and nuts, several types of pastas and condiments, and a few winter storing vegetables that are all certified organically grown.

Of all these products, only one can be purchased in New Brunswick, that being buckwheat flour which we are pleased to obtain from the Speerville Mill Co-op, near Debec. Most of the others are obtained from Ontario and Quebec where growers have formed sustainable agricultural organizations to share information and promote the growth and distribution of their products.

I would like to point out that even though most organically grown products sell at a higher price, they are of very high quality and consumers are willing to support sustainable agriculture by paying the higher price. Of course, prices could be lower if more products were produced in New Brunswick.

We have spoken to many farmers in the province in regard to obtaining more products locally, and although several are interested in becoming less dependent on chemicals or in giving them up completely, most cite the fact that there is just no information available to assist them.

The purpose of this short brief is that through this Board I would like to ask the Ministry that is responsible for regulation and control of pesticides used in New Brunswick, and the Ministry of Agriculture, to take the initiative to provide information on alternative farming practices to New Brunswick farmers, so that they may begin reducing the emphasis on pesticides, chemical fertilizers, herbicides, insecticides, fungicides, and growth hormones and regulators. Thank you.

CHAIRMAN: Thank you very much. Are there any questions from Members of the Board?

Q: I'd like to know what are the requirements for a farm or a supplier to be qualified as an organic gardener? Are there guidelines set out?

A: Yes, there are organic standards set up by each <u>unintel-ligible</u>

Q: Does that mean that that individual would not use any synthetic products or pesticides or fertilizers in that year or do you have to have some...

A: Yes, it has to be for at least three years with no chemicals, some are longer..five years.

<u>Unintelligible</u>

Q: You stated more and more people...what kind of numbers are you talking here and are there other individuals in the whole food business that operate and that are finding the same situation here in the province of New Brunswick or the Atlantic region?

A: Definitely, there's a store in Edmundston that sells virtually all organic products, stores in Moncton, I can't speak very well for Nova Scotia, they have a sustainable agriculture organization formed called unintelligible

Q: Do you spend quite a bit on products coming from outside New Brunswick?

A: We do.

Q: These other stores?

A: Oh, definitely yes.

Q: Would you entertain questions from the floor? Are there any questions from the floor? If not, thank you very much.

DAVID COOMBES

I'm David Coombes and I'm a doctor of virology and a molecular biology professor at U.N.B. and I have some other experiences which are probably notable here and I was the project manager for a viral insecticide for forest unintelligible moth managing out west five years ago involved with a company, Agri Food, involved in the release of sterilized insects as a way of controlling bullworm infectors in cotton. The synthesis of pheromones unintelligible.

I think I have in my capacity as a bio-chemist and molecular biologist and as a sort of practitioner of this new era I think, of pest management, a different point of view than most people. I think first of all as a professional molecular biologist that I have been exposed in the last five years, let's say, to the impact of molecular biology on science, basically chemistry. And recombinant DNA has made possible so many albums of new experiments that it has boggled our minds, that I think I want to share with you tonight first of all, my point of view.

Why am I here as a PhD telling you that the spraying of poisons is a giant mistake? The reason comes sort of, of course it starts from the heart, I think that's the most important thing to realize is that I have a predisposition for this kind of thing. But I think I have gained some support in my last several years as a lecturer, and as a researcher in the field of microbiology to support my point of view with some hard facts.

To come from a virus that I'm sure none of you have never heard of before, it's a virus which infects a bug that's in our guts and this virus has the choice of going either to live with the host cell as part of its chromosome or to kill it. And to make many more viruses in the process.

This virus makes a decision basically, it doesn't make up it's mind but it does make a decision about whether it's going kill the cell or live with it peacefully for many generations. There is an incredibly beautiful biological switch which is made to turn the right genes on to kill the cell, and the right genes on to live with it, it has the perfect response. It also has several sensory proteins that it puts out to find out what state the cell is in. If it's a very healthy cell, the virus will kill it, if it's a very sick cell, the virus says let's wait on it a little bit until it gets healthier and then we'll kill it.

So, what I'm trying to get at, this has nothing to do with pesticides of course, but what I'm trying to get at is that I have come to realize that something that I think we've all intuitively know. And that is that nature is represented by this little tiny insignificant virus or by any one us, is almost perfect. And it's incredible. I think if we all sat back and looked at what you're sitting here, that your molecules are all functioning, you're thinking, you're talking, you're digesting your supper, you're sweating, you're doing whatever you want to do at the same moment. This is a miracle. It's still a miracle. Every time I lecture on the subject, it's still a miracle. We're here, that we've evolved over millions and billions of years to be what we are today.

And this comes back to the pesticide question in the form of a belief, a fundamental belief on my part, and I think it should be a fundamental belief on everyone's part, that nature knows what it's doing. Basically. There's no question in my mind having looked down at the very depths of the molecular level, that nature knows exactly what she is doing. And that what we should be doing most of all in our management practices is to foster nature's own best methods and not to interfere with those methods as we are currently doing.

Now with that sort of preamble, I want to get into the specifics. I'm supposed to be representing the Conservation Council tonight. Obviously that preamble has nothing to do with the Conservation Council.

Dr. Lucy Dyer has already given you a brief summary of our concerns of groundwater. It's my duty to convey to you the sense of the Conservation Council that this whole process which we are involved in is wrong. It begins with the fact of this meeting tonight. The makeup of the Board is first subject of some controversy of disagreement amongst ourselves. First of all, there is not one woman among you, a very important element which is lacking. Secondly, there is no one among you except government representatives unintelligible. Now, I think this goes sort of to the root of the problem.

There's a conception I think that you probably all think is correct, that government represents the honest broker. The government can deal with all of our problems for us as though we should say let them go ahead and do it. It's my belief and it's our concerted belief that is a tremendously fallacious idea. And nobody suggests for a moment within reality, that government does anything except look after its own self interest. The self interest of government is not always unintelligible. I think this comes out when we..

In the make-up of the Board, you are without public representation. We've asked you since our first brief in 1978 to include the public in your decision making process, to include management, to include labour, to include science. You do have a scientist on the Board. I think this is a critically important area for discussion and I hope that in future that the Pesticides Advisory Board, whatever it ends up being called, unintelligible, has the guts to go ahead and ask for public input whether it be from environmentalists or industry or labour or whatever. Because only when you have this input will you have the full picture. I think the problem is that you think you have all the angles. You make up your minds and you decide to tell the Minister of such and such that that is the proper decision. Yet it is without public input except for this ridiculously short four hour meeting that you have once a year. That's not the kind of input anybody should accept as a tolerable level.

Now you have in past, it has to be said, listened to us a little bit. I remember that you moved the date of the meetings from February or March or April right around the spray program time back to some reasonable time in December. We asked you to strike a Task Force on Cancer and Birth Defects and you did so. We appreciate that very much. You took the responsibility away from Agriculture and put it back where it belongs. You added a member of the Health department and six years after we recommended it you finally got around to it, the province finally got around to it.

These are all nice changes, but they are toothless because there is no input, once we are through with our presentations the public is simply gone, we get up, go home, for our purposes this is too early to end. We don't have a handle on, we don't have any way of arguing or questioning your decisions. You simply go make your recommendations to the Minister, you have no idea whether that recommendation, you've never been responsible to tell the public what it is that you recommend, so we can question its validity.

So I would suggest that the most important recommendation that we've made in the last five years perhaps, or eight years, is the one about opening the meetings up to the public and including the public as part of your Board has not been addressed and you are simply skirting around the issue and not getting down to business.

The other thing that I've already said is that this is a monologue, not a dialogue. We all sit here, we come up to the microphone for our ten or fifteen minutes, we speak to you and there's no chance for me to pick your brains. There's no chance for me to challenge your beliefs. You can challenge mine all you like, you can sit on the Board and ask any question you like, but I cannot question your beliefs. I think that is basically wrong. This has to be a dialogue not a monologue.

Now, the second major thing that I think has not been addressed is this question of risk assessment. I've heard it again tonight and it distresses me that it's still being bantered around. We are faced with policy makers again and again and again saying alright you show me that there's a problem with this chemical and I'll ban it. What do you think I want to do? Kill babies, cause cancer? It's ridiculous. Of course I don't. You can show me a case where this is happening, prove it to me and I'll take this chemical off the market.

This argument is obviously totally fallacious. We haven't got the money, the time, not any of the resources to prove conclusively that any of the pesticides which we are spraying can harm you. They go through a registration process, that is simply, fundamentally flawed, basically flawed, because it doesn't have all the answers. We can only ask certain questions. Think about what's been done. You've all been made aware of the registration process for FENITROTHION, a limited amount of testing. Two or three different kinds of experiments.

Now they've just come up with another example of ineligible breakdowns as a result of very low level, one ppb. Now we didn't test for that unintelligible. How many other tests have we not done that might eventually come up to haunt us in the end? My emphasis is completely the opposite of that. I think we have to get away from this idea of 'you prove it to me that we have a problem with this chemical.'

My idea and the one that Hajo Versteeg so eloquently placed here two years ago (unintelligible, end of tape) that we must do effectively, an environmental Task Force for every chemical that we spray. It gets to be a very difficult process and I'm sure the chemical companies would flail their arms in the air if we ever got into this kind of thing but it's really the kind of thing that we should be doing.

We have no way of knowing what are the alternatives to these methods. Have they been considered first rather than second? Are you looking at the chemical first and then asking whether the chemical is no good or maybe an alternative second. We should really be looking at the alternatives first. That's the last one.

The whole emphasis, going back to my concept that nature is perfect, the whole concept is to help mother nature do her thing. When you apply a broad spectrum pesticide, insecticide, to the environment, what do you think you're doing? Do you think you're just hitting the target species? Do you think that it's going to have this magic silver bullet which goes in and just dings the aphid or the budworm that you're after? Obviously not. Anyone with half a brain can figure that one out. So what are we doing to the environment? We're killing all these non-target species which are supposedly beneficial to keep the whole ecosystem in more of a perfect balance which is already there before we started messing with it.

And I go back to this, one of the first presentations tonight. The idea was that we should spray the forests, we have been spraying the forests for the last 30 years because we needed to protect the trees. As we shift more towards biological control, and I know that everywhere besides New Brunswick is doing this in a very big way, we're getting into it a little bit but we have a long way to go, that the budworm infestations seem to be dying.

I recall three years ago I think it was, at McLaggan Auditorium at U.N.B. there was a seminar presented and the fellow was from one government department and he was showing a graph of budworm infestations in the province. And he showed it for 1930-1950 and in every case that he's gone woop, woop,woop and it'd gone up and down and disappeared every year. Then we got into the situation in 1949 and 1950 where we started using DDT and have been hooked on chemicals ever since, where the infestations persisted. Yet the last two years of this fellow's graphs showed a decline. Now that's unintelligible. What do we have to say about this? I think that's kind of a joke. It's kind of a funny joke on him. You've been spraying for 30 years, we've prolonged, I think, this infestation for 30 years and now finally it's dying on its own.

Because we haven't been able to kill all the predators and all the helpful species which might unintelligible. As we've gotten more and more reasonable in our use of the pesticides, I think more careful, we haven't sprayed every single acre. We've allowed for these residues of harmful insects unintelligible.

So I come to the point where I'm so frustrated with this whole pesticide problem because it's coming at us from completely the wrong point of view. You're coming at it, here's the chemical now what do we do about it? Let's throw that out. Let's do something different. Let's go to a point of view that says here's the problem, what are we going to do about it. Here's the pest. I think Cathy Richards has the right idea, Pest Control Board is a much better name for you. It'd be much more useful to the environment, then you can consider each problem rather than each chemical as it comes along. You see, because once we get into a chemical situation where we're already pre-disposed to using them, we are definitely facing a risk. There's just no doubt about it.

Every chemical has associated risks with it. BT has far as I know has no risk associated with it, to human beings or anything except unintelligible, the insect that it's supposed to kill. The virus that I was growing in Los Angeles was targeted only against the unintelligible. It was an incredible silver bullet. Two dead caterpillars represented virus 10% by weight and you could spray an acre with two dead caterpillars.

Now, this is the kind of thing that we should be doing in New Brunswick. The fellow who just spoke from the Federation of Agriculture has said we're hooked on chemicals and when I look at my grab bag forty years ago, when I went down looking 40 years ago, I was horrified. We were using arsenic, we were using lead and zinc, not zinc, copper and all kinds of horrible chemicals.

Well I maintain and I pray that 40 years from now when he goes down and looks at his little shelf at what is being used today that doesn't equal unintelligible. That 40 years from now we will have gotten away from our total dependence on chemicals and we will be into a more reasonable, rational approach which involves consideration of the pests, consideration of the alternatives to managing that pest and finally, when nothing else works maybe we'll use a chemical.

Thank you very much.

CHAIRMAN: Just one point of clarification and it was my error that there are two members on the Board from the Department of Health and Community Services. Dr. Donald Ecobichon, who is a toxicologist and he was not able to make it this evening. And another point is that the Pesticides Advisory Board is an advisory Board to the Minister. The Board does not make the final decision with regards to whether or not any program is permitted or not. We just advise the Minister and the Minister looks for advice not only from the Board but from the Minister of Health or any other Minister or from the public if he so chooses.

COOMBES: It's a very political process and I think that poisoning the environment is not a political process.

CHAIRMAN: Are there any questions from the members of the Board? Would you entertain questions from the floor? Are there any questions from the floor?

LARGE SECTION OF TAPE INAUDIBLE.

CHAIRMAN: I've come to the bottom of my list. Is there anyone else who wishes to make a presentation? Last call.

If anyone would like to receive copies of the transcripts of this meeting, will you please leave your name and address with me before they leave. Thank you.

If there is nothing else, then I wish to thank those people who came out this evening and did make presentations. We've received quite a number and quite a variety of recommendations. These will be put forward to the Minister of Municipal Affairs and Environment. I'd also like to thank the members of the Pesticides Advisory Board for coming this evening. Thanks to the clerk from the Information Section of the Department of Municipal Affairs and Environment and also to the Translation Bureau who came out and I hope they were able to keep up with all the speakers. Nothing further, I wish you a safe drive home and a good evening.

APPENDIX I: ARTICLE SUBMITTED BY THE CONSERVATION COUNCIL OF NEW BRUNSWICK: "ALDICARB IMMUNOSUPPRESSION IN MICE: AN INVERSE DOSE-RESPONSE TO PARTS PER BILLION LEVELS IN DRINKING WATER."

UNIVERSITY OF WISCONSIN–MADISON

CENTER FOR ENVIRONMENTAL TOXICOLOGY

School of Medicine | School of Natural Resources, College of Agricultural and Life Sciences | School of Pharmacy

June 27, 1985

Eleanor Butz
Senior Editor
Science Magazine
1515 Massachusetts Avenue, N.W.
Washington, D.C. 20005

Dear Ms. Butz:

Enclosed are an original and two duplicates of a report to consider for publication in Science. The report is titled: "Aldicarb Immunosuppression in Mice: An Inverse Dose-Response to Parts Per Billion Levels in Drinking Water." We found significantly greater immunosuppression with 1 part per billion of aldicarb than with 1000 parts per billion. This was a graded, inverse dose-response effect that occurred with two different experiments. This unusual finding is contradictory to the classic toxicity relationship of greater dose equals greater effect. We have proposed a polyphasic curve to account for the full dose-effect range and our actual data accounts for a portion of this curve. These results call into question the validity of assuming that very low doses of a compound in drinking water are safer than high doses, which is what EPA suggested drinking water contaminant levels are based on. These data demonstrate that toxicity occurs at levels substantially lower than previously indicated. The authors feel that Science is the most appropriate journal for dissemination of these most unusual and disturbing findings.

The following people would be qualified to review this report:

Dr. Loren Koller
Veterinary Medicine
University of Idaho
Moscow, ID 83843
Interest: Immunotoxicology of heavy metals and pesticides.

Dr. R. P. Sharma
Toxicology Program
Utah State University
Logan, UT 84322
Interest: Immunotoxicology of environmental contaminants.

Dr. Lawrence Fishein
National Center for Toxicological Research
Jefferson, AK 72079
Interest: Head of toxicological research institute

Dr. Leland Loose
Pfizer Central Research
Eastern Point Road
Groton, CT 06340
Interest: Toxicology and immunotoxicology in mammals.

Dr. Robert Metcalf
Department of Entomology
University of Illinois
Urbana, IL 61801
Interest: Toxicology of insecticides

1550 Linden Drive Madison, Wisconsin 53706 Telephone: 608-263-4580 262-3284

Colleagues at U.W. Madison who have reviewed this paper are Drs. M. T. Hsia (Dept. Entomology) and Eric Erickson (U.S.D.A. Bee Research Lab/Dept. Entomology), as well as the authors.

This material has not been published and is not under consideration for publication elsewhere.

Sincerely,

Leon John Olson, Ph.D.
Assistant Scientist
Environmental Toxicology Center
Tel. 608-253-4572

Ronald D. Hinsdill, Ph.D.
Professor and Chairman, Dept. Bacteriology

aldicarb at 10, 100 and 1000 ppb dissolved in their drinking water (double distilled water given ad lib). A distilled water control was included for baseline data (9). After 10 days, the mice were challenged with sheep red blood cells (SRBC's) and sacrificed 4 days later. The following parameters were measured: body weight (wt); spleen wt; kidney wt; liver wt; thymus wt; heart wt; white blood cell (wbc) count; differential wbc; plasma protein; hematocrit; bone marrow nucleated cell (bmnc) count; splenic plaque forming cell (PFC) assay; lymphocyte viability and serum hemolysin titer.

Significant reductions in both PFC's/gm of spleen (Fig. 1a) and the ratio of PFC's/10^6 viable spleen lymphocytes (Fig. 1b) demonstrated an unusual relationship whereby the low dose (10 ppb) elicited the greatest PFC reduction. The PFC assay determines the number of specific anti-SRBC antibody secreting plasma cells; a reduction in their numbers indicates either reduced levels of antibody and/or inability to respond to antigen challenge, i.e., SRBC's (10). This is a T-lymphocyte (T-cell) dependent process, hence reduced PFC levels can also indicate that T-cell related functions were affected (11). Other parameters also shared a general inverse dose-response, including wbc count, heart, kidney, and thymus wts.

A 34-day drinking water study was then conducted with a 30 day dosing of aldicarb before antigen (SRBC) injection, thus creating a 3-fold increase in time prior to antigen stimulation between the two studies. The number of mice (Sasco/King, Madison, WI) used was increased to 10 per dosage level and one additional aldicarb dose (1.0 ppb), was added (9).

PFC's/gm spleen again exhibited the inverse dose-response relationship observed in the 14 day study, although the 34 day curve was less dramatic in scale (Fig. 2a), with a maximum suppression to 38% of the control PFC response at 1 ppb aldicarb. At 10 ppb the suppression was to 60% and 46% of the control for the 14 and 34 day studies, repectively. The 1 ppb and 1000 ppb levels were highly significantly ($p<.01$) different from the control values and each other. The ratio of PFC's/10^6 viable spleen lymphocytes demonstrated the same inverse relationship (Fig. 2b). By day 34, the number of lymphocytes/gm of spleen had dramatically declined from the levels seen at 14 days, and the ratio of PFC's/10^6 lymphocytes was higher in 34 day mice, although still reduced significantly at the lowest 34-day aldicarb dose (1.0 ppb). Serum hemolysin titer levels were assayed and appeared elevated but, given the doubling dilutions used in the assay, were considered nonsignificant from control values.

Minor inverse dose-response effects were demonstrated with heart and kidney wt ratios, where increases showed at the lower aldicarb levels (Table 1). Thymus wts were depressed almost evenly at all doses, whereas spleen wts were elevated almost uniformly.

The total white blood cell populations in peripheral blood declined to 66% of control values as the aldicarb dose decreased to 1 ppb (Fig. 2c). Both the 1 ppb and 1000 ppb doses were signifantly lower than the distilled water control ($p<.05$) and the 1 ppb level effect was significantly lower than the 1000 ppb dose.

The results demonstrate the immunotoxic potency of aldicarb at extremely low levels in the drinking water of mice. The fact that outbred mice were used rather than an inbred strain, which might possess a peculiar sensitivity, adds to the significance of these results. The most remarkable feature

uncovered is the striking inverse dose-response effect elicited after both 14 and 34 days of aldicarb exposure. This response runs counter to the classic concept of higher toxicity with increasing dose (12). We refer to this classic concept as a monophasic response (Fig. 3a). Although some parameters of immune function can be elevated by immunotoxicants, such as Immunoglobin E levels by cyclophosphamide (13) and hemolysin titers by glyphosine (14), the overall effect of known toxicants and immunosuppressants is to exhibit greater toxicity at increasing doses of the compound.

A second type of response is a biphasic response, whereby low levels of a compound actually stimulate the immune system (Fig. 3b); then, as the dosage increases, toxicity increases. Cyclophosphamide, widely used to prevent organ transplant rejection, is a classic example of this effect (15). This biphasic response is presumably far less common than the monophasic response.

The immunotoxic response demonstrated by aldicarb in the studies presented here obviously does not fit either the mono- or biphasic category. Hence, we postulate that aldicarb induces a polyphasic response, as presented in Fig. 3c (via a hypothetical compound). At some very low dose there would be no effect and at very high doses there would be severe immunosuppression or death. In between, however, we see varying degrees of immune stimulation and inhibition depending on both toxicant dose and timing of antigen stimulation. Portions of the curve show an inverse dose-response where immune function increases with increased doses, and may reach normal control values. As dosing increases, the chemical becomes more suppressive and toxic, with death occurring at some point. Explanations of the inverse dose-response curve are beyond the scope of this report, but may be associated with dose related detoxification in the intestinal tract or body, or possibly the clearance of antigen aided by antibody (induced through conjugation of the

chemical to naturally occuring proteins and followed by elicitation of specific antibodies). The actual mechanism remains to be explored.

Figure 3d illustrates how the aldicarb results fit the polyphasic model. The tested dose range of 1 to 1000 ppb lies on the inverse response portion of the curve. At some lower level (e.g. 0.1 ppb, 0.01 ppb, etc.) of aldicarb, the immune function should be normal. The highest dose tested was a 3-5 fold dose away from the LD_{50} level, hence death would start occurring on the curve near the normal immune function values (the 1000ppb dose in drinking water converts to approximately 0.2 mg/kg mouse/day). Death from acute exposure to aldicarb would normally result from neurotoxicity, before complications due to immunosuppression developed.

The lower aldicarb doses used are far less than doses usually tested in toxicity studies, even for a compound with such a high mammalian toxicity. At higher doses, mammals excrete aldicarb as several liver derived metabolites by the kidney (90%) and the bile (5%) within 2 days (16). Due to the low levels of field application and its rapid mammalian elimination, aldicarb has been approved by the E.P.A. for widespread use on numerous crops. Permitted E.P.A. tolerance [illegible] in some foods are: peanuts, 50 ppb; sugar 50 ppb; citrus, 300 ppb; and potatoes, 1000 ppb (17). Given the inverse dose-response, where 1 ppb was significantly more immunotoxic than 1000 ppb, further serious inquiries must be undertaken, both out of concern for public safety and for scientific interest. Studies to clarify the polyphasic model and elucidate the mechanism of action at low doses are currently underway.

Table 1. Body weights, organ/body weight ratios, and hemolysin titer values of white mice with varying levels of aldicarb in drinking water for 34 days ($\bar{X}$ ± SEM, N = 10).

	Water	1	10	100	1000
Beginning Body Weight (gms)	23.2 ± 0.3	23.3 ± 0.5	23.3 ± 0.4	24.0 ± 0.5	23.1 ± 0.4
End Body Weight (gms)	25.7 ± 0.5	24.7 ± 0.6	24.8 ± 0.5	25.6 ± 0.5	25.3 ± 0.6
Heart wt/Body wt	4.03 ± 0.12	4.67 ± 0.12	4.40 ± 0.11	4.36 ± 0.12	4.46 ± 0.13
Thymus wt/Body wt	1.99 ± 0.27	0.18 ± 0.07	1.78 ± 0.12	1.89 ± 0.13	1.81 ± 0.15
Kidney wt/Body wt	1.12 ± 0.02	1.21 ± 0.02	1.20 ± 0.02	1.17 ± 0.01	1.17 ± 0.02
Spleen wt/Body wt	4.56 ± 0.41	5.32 ± 0.29	5.88 ± 0.40	5.36 ± 0.37	5.58 ± 0.25
Liver wt/Body wt	5.39 ± 0.27	5.33 ± 0.14	5.46 ± 0.11	5.30 ± 0.13	5.46 ± 0.14

Fig. 1. (a) Plot of plaque forming cells/gram of spleen vs. 3 aldicarb drinking water doses given for 14 days [X ± standard error of the mean (SEM)]. The PFC assay was performed in Swiss Webster white mice (Sasco/King Inc., Oregon, WI) after sheep red blood cell (SRBC) injection on day 10 as described by Olson et al., 1983 (14). The mice were 12 weeks old at the experiment start, fed Purina Certified Rodent Chow (Ralston-Purina Co., St. Louis, MO) ad libitum, housed 5/cage and had a 14/10 light/dark cycle. (b) Plot of PFC's/10^6 viable spleen lymphocytes versus 3 aldicarb doses in the 14 day experiment.

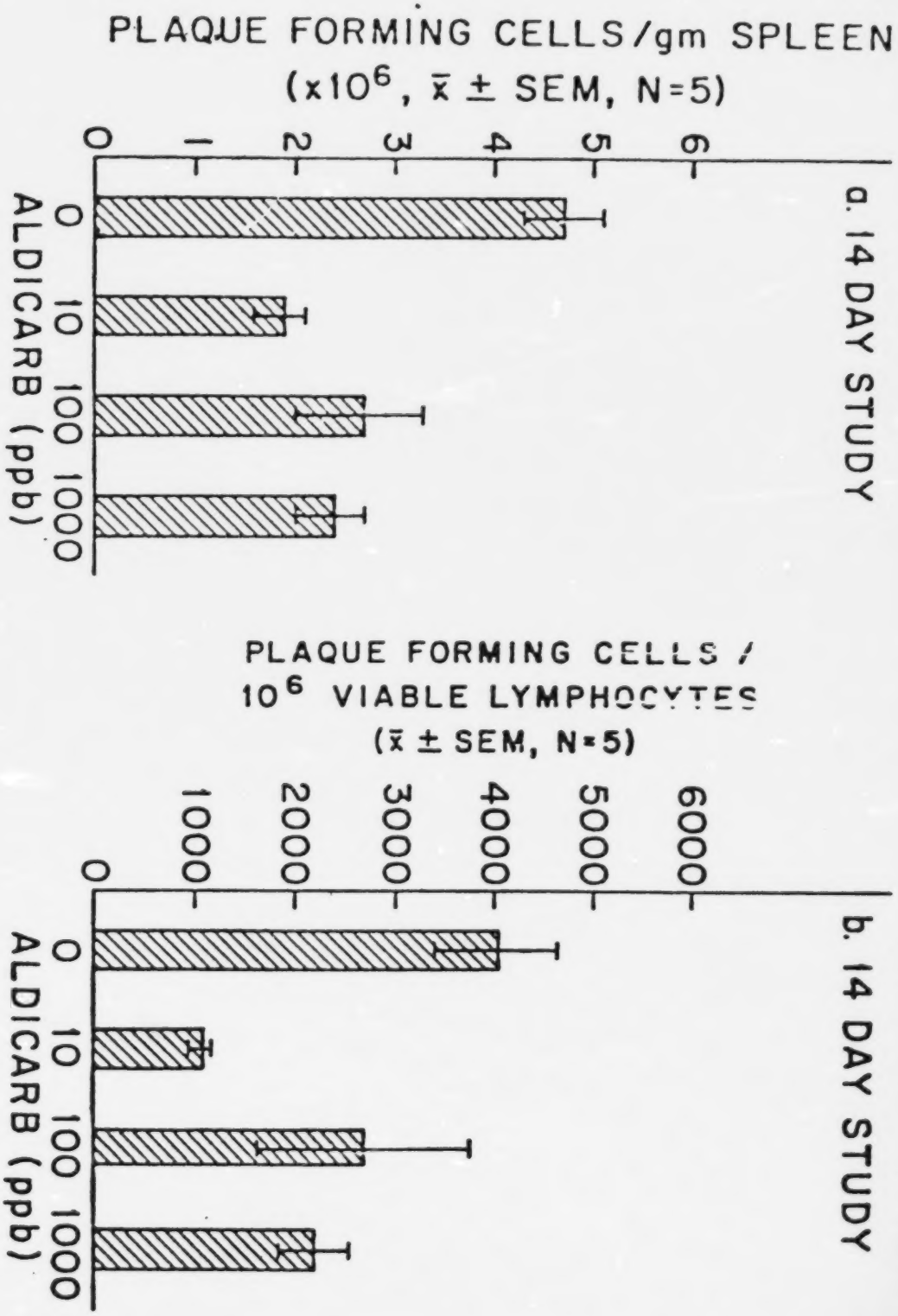
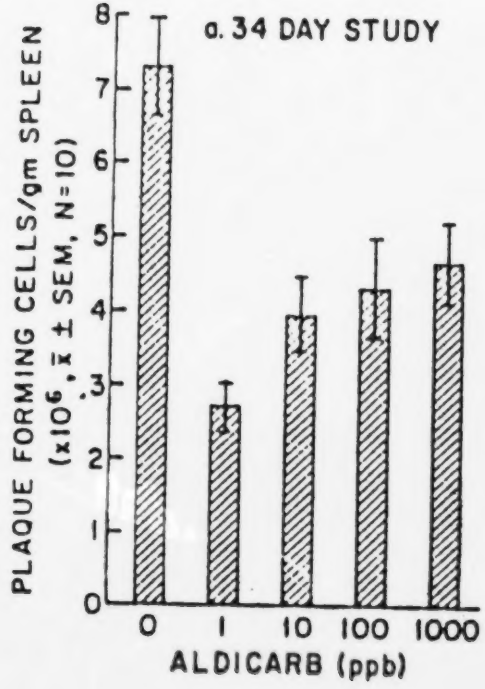
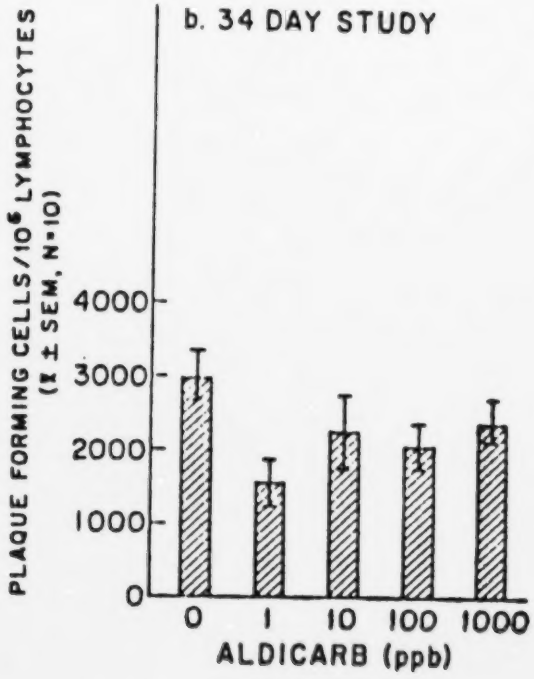

PLAQUE FORMING CELLS/gm SPLEEN
(x10^6, x̄ ± SEM, N=5)
0
1
2
3
4
5
6
0
10
100
1000
ALDICARB (ppb)
a. 14 DAY STUDY
PLAQUE FORMING CELLS /
10^6 VIABLE LYMPHOCYTES
(x̄ ± SEM, N=5)
0
1000
2000
3000
4000
5000
6000
0
10
100
1000
ALDICARB (ppb)
b. 14 DAY STUDY

Fig. 2. (a) Plot of PFC's/gram of spleen vs. 4 aldicarb drinking water doses given for 34 days. The PFC assay was performed in 10 week old Swiss Webster white mice (Sasco/King Inc., Oregon, WI) after SRBC injection on day 30 as described by Olson et al., 1983 (12). The mice were fed ad libitum Purina Certified Rodent Chow (Ralston Purina Co., St. Louis, MO), housed 5/cage, with a 14/10 light/dark cycle. (b) Plot of PFC's/10^6 viable spleen lymphocytes vs. 4 aldicarb doses in the 34 day experiment. (c) Total peripheral white blood cell counts [see Olson et al., 1983 (12) for methodology] for 34 day mice given 4 different doses of aldicarb.


a. 34 DAY STUDY
PLAQUE FORMING CELLS/gm SPLEEN
(x10⁶, x̄ ± SEM, N=10)
0
1
2
3
4
5
6
7
8
0
1
10
100
1000
ALDICARB (ppb)


b. 34 DAY STUDY
PLAQUE FORMING CELLS/10⁶ LYMPHOCYTES
(x̄ ± SEM, N=10)
0
1000
2000
3000
4000
0
1
10
100
1000
ALDICARB (ppb)

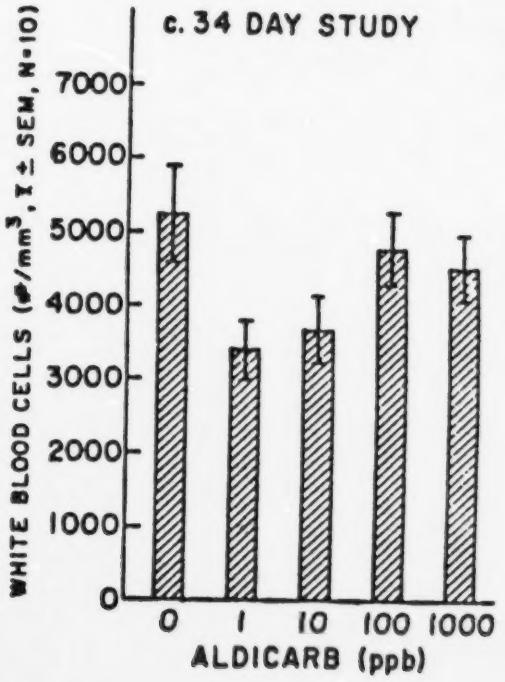
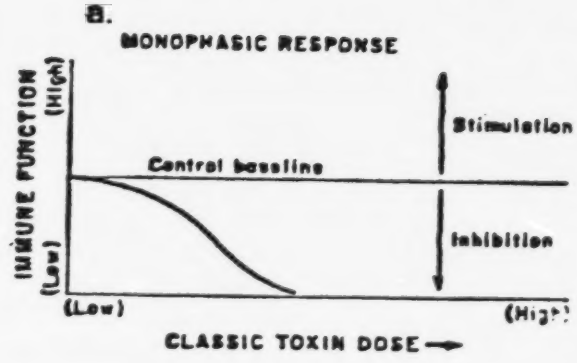
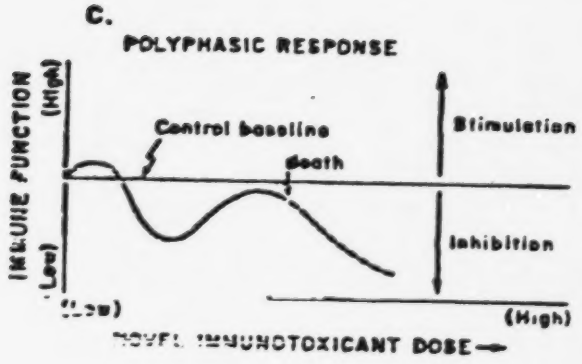
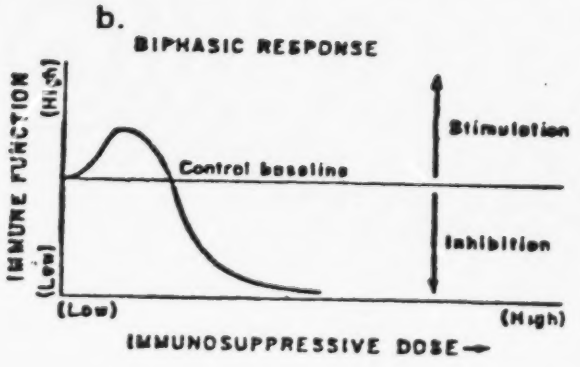
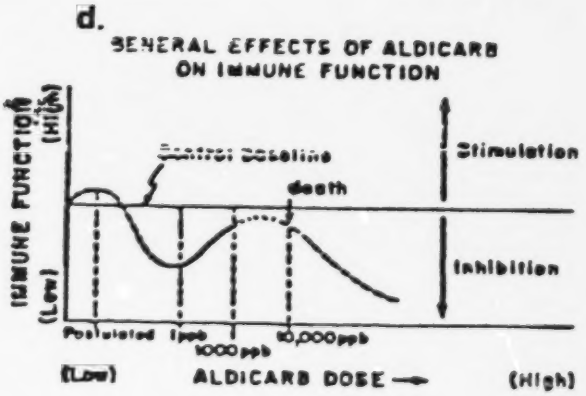

c. 34 DAY STUDY
WHITE BLOOD CELLS (#/mm³, x̄ ± SEM, N=10)
0
1000
2000
3000
4000
5000
6000
7000
0
1
10
100
1000
ALDICARB (ppb)

Fig. 3. (a) Graphic representation of the classic monophasic dose-response effect. (b) Plot of the biphasic dose-response observed with some immunosuppressive chemicals. (c) Hypothesized polyphasic response of novel immunotoxicants as suggested by the aldicarb inverse dose-response seen in both the 14 and 34 day studies. Death, although shown as a discrete point, could occur anywhere along the righthand side of the curve, depending on the animal tested, cause of death or other factor. (d) Fit of actual Aldicarb data (solid line) into the proposed polyphasic response.


a.
MONOPHASIC RESPONSE
IMMUNE FUNCTION
(High)
(Low)
Control baseline
Stimulation
Inhibition
(Low)
(High)
CLASSIC TOXIN DOSE


c.
POLYPHASIC RESPONSE
IMMUNE FUNCTION
(High)
(Low)
Control baseline
death
Stimulation
Inhibition
(Low)
(High)
NOVEL IMMUNOTOXICANT DOSE


b.
BIPHASIC RESPONSE
IMMUNE FUNCTION
(High)
(Low)
Control baseline
Stimulation
Inhibition
(Low)
(High)
IMMUNOSUPPRESSIVE DOSE


d.
GENERAL EFFECTS OF ALDICARB
ON IMMUNE FUNCTION
IMMUNE FUNCTION
(High)
(Low)
Control baseline
death
Stimulation
Inhibition
Postulated
1ppb
1000ppb
10,000ppb
(Low)
ALDICARB DOSE
(High)

APPENDIX 2: LIST OF RECOMMENDATIONS PRESENTED TO THE PESTICIDES ADVISORY BOARD BY THE CONSERVATION COUNCIL OF NEW BRUNSWICK AT PREVIOUS HEARINGS, AS SUBMITTED AT THE PRESENT HEARING.

It could make extensive aerial spraying of insecticides a thing of the past, replaced by selective spraying by ground machines or helicopters. It could result in reduced forest road construction with its attendant problems of soil erosion and siltation of streams. It could reduce the disturbance of wildlife thus increasing production while protecting endangered species. Finally, the opportunity arises for creating thousands of new jobs in areas of high unemployment.

The Conservation Council welcomes the steps announced by the Minister of Natural Resources in the Legislature last week regarding stricter forest management controls on Crown land leases.

'78- RECOMMENDATIONS

1. The composition of the Pesticides Advisory Board should be expanded to include members from industry and the lay public.

2. There should be evaluation of the risk to the public where the public may be involved as a third party in any proposed pesticide use.

3. All permits granted by the Board and all Board decisions should be made public.

4. Board hearings should be open to the public when:
   a. large tracts of land are involved or
   b. wide public exposure is anticipated or
   c. public funding is involved.

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5. The Board should hear applications at a sufficient time before the proposed pesticide use so that information concerning the chemicals and their proposed utilization are approved prior to their purchase.

6. The Board should have funds available to obtain the services of an epidemiologist and a toxicologist to evaluate the health risks in chemical formulations.

7. The public should be given assurances that all alternatives to spraying with pesticides have been explored before an application can be approved.

8. The Board should hear opponents of any major pesticide application before granting a license.

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'79- SUMMARY OF RECOMMENDATIONS

1. An annual report should be published by the Board. All permits granted by the Minister and all Board decisions should be made public.

2. The composition of the Pesticides Advisory Board should be expanded to include members from public interest groups and labour.

3. There should be an evaluation of the risk to the public or to the environment when either may be involved as a third party in any proposed pesticide use. The public should be consulted in this evaluation.

4. All alternatives to spraying with pesticides should be assessed, and the assessments made public, before an application can be approved.

5. A toxicologist should be hired immediately by the New Brunswick Department of Environment to work with the Pesticides Advisory Board to evaluate risks and to assist in monitoring and enforcing regulations.

6. The Pesticides Advisory Board should have full access to any federal research information on the pesticides to be used in this Province.

7. Inspectors presently employed in the Departments of Environment and Health should be designated inspectors under this legislation.

8. Monitoring of the environmental effects of a spray program should be funded by an independent agency.

9. The Pesticides Advisory Board should hear and decide upon the chemicals to be used in the spruce budworm spray application before the insecticides have been ordered. The public hearing should be held prior to this decision, but after the application has been received and made public.

10. Purchase of pesticides should be prohibited unless a permit for their use has been obtained, if required.

11. The use of 2,4,5-T and 2,4-D should be banned in New Brunswick immediately.

12. All pesticides should be screened for teratogenic, mutagenic, viral enhancement and neurotoxic effects. Registration should be contingent upon satisfactory results.

SUMMARY OF RECOMMENDATIONS (continued)

13. The complete formulation of a pesticide should be tested by an independent agency before approval could be given by the board.

14. Matacil should not be used to control the spruce budworm alone or in formation with nonylphenol.

15. An integrated control program should be developed for the control of spruce budworm based on improved forest management supplemented by use of properly tested biological controls. In particular, research into pheromones should be given highest priority.

16. We recommend that the PAB require those who conduct aerial spray applications to report incidents of people being sprayed to DOE inspectors.

17. Pilots should be required to make every effort possible to avoid spraying people.

18. Funds should be allocated to investigate the effects of present and past pesticide use on human health.

19. That the Department of Health institute a program of well water sampling in agricultural regions in the Province, especially in the potato producing areas of Carleton and Victoria Counties.

20. That the Department of Environment increase its program of monitoring pesticide levels in streams and rivulets adjacent to potato farms.

21. That the use of aircraft for application of agricultural pesticides be banned.

22. That, since all licensed vendors of pesticides are required by the Pest Control Act to keep a record of pesticide sales, vendors should be required to send records at the end of each calendar year to the Department of Environment and that Department should compile the information and make it available to the interested public.

23. That, since some farmers may dispose of unused pesticides contained in an improper and environmentally deleterious way, Department of Agriculture officials encourage the use of approved disposal sites and more stringently enforce Sections 24 and 26 of the Pesticide Control Act.

24. That educational programs aimed at improving farmers' methods of applying, handling and disposing of pesticides be instituted in productive rural communities.

25. That some sort of public education program be established, if even on a small scale, to increase public acceptance of superficially flawed produce (What are the trade offs between cost, taste, external appearance and pesticide use?!).

26. The Department of Health should conduct an investigation into the epidemiology of diseases such as cancer, nervous disorders or kidney diseases in the "Potato Belt". The results should be compiled and made available to interested members of the public.

27. That, as organic farming has proven to be viable and competitive with conventional farming systems on a net production basis (gross production minus costs of inputs) elsewhere in North America, the Department of Agriculture should encourage and assist farmers who wish to make that transition by acting as a consulting body on orgnic methods, coordinating operations between farms, and providing compensation for those farmers that incur losses in their first years of adjustment.

SUMMARY OF RECOMMENDATIONS

The Conservation Council of New Brunswick recommends that:

1. When significant amounts of pesticides are involved, the provisions of Section 13 of Reg. 77-20 should be made applicable to appliers as well as to vendors.

2. A new sub-section should be included in Section 10, which would require that pesticide appliers should notify the Board, the local fire department and the Police department of all locations in which significant amounts of pesticides are stored for more than a short period of time.

3. Section 17 should be cahnged to require that information on the quantity of each pesticide sold by a vendor be sent to the Director annually.

4. The Minister of the Environment place an immediate ban on the use of 89 pesticides whose safety is suspect because of the IBT test until such time as their safety, and the safety of any proposed formulation, has been proven by valid tests (including carcinogenicity and mutagenicity tests). No pesticide should be approved for use unless adequate tests of its safety to non-target organisms have been done, and its performance shown to be satisfactory. The tests should use the pesticides in the formulation and quality proposed for actual application.

5. No further permits for the use of 2,4,5-T be issued. We should also request that the Minister of Environment or the Minister of Health immediately make public the scientific evidence on which the decision to life the temporary ban imposed last year on the issueing of permits for 2,4,5-T based.

6. A temporary ban be placed on issuing permits for the use of 2,4-D until further studies can prove that this does not represent an unacceptable risk to human health or to the environment.

7. Efforts continue to be made to keep the exposure of personnel to a minimum.

8. The Department of Health develop an educational program on safe use of pesticides which could be presented to groups of workers who use pesticides or come in contact with them in the course of their work, such as agricultural workers.

9. Monitoring of the effects of pesticides, including herbicides, on human health and on the environment should be instituted at once.

10. A program of well-water testing be conducted in agricultural areas (especially Carleton and Victoria Counties) to determine if pesticide residues or fertilizer leachates are reaching the water table and contaminating rural drinking water. Furthermore, the Department of Health should conduct blood sampling of farmers, and commercial applicators of agricultural chemicals.

11. The Department of Environment monitor ambient air quality during several periods of the growing season in agricultural areas and make their findings available to the public as soon as possible.

12. The Department of Agriculture develop a continuing program to assist market farmers to produce and market organic produce.

I. ANNUAL SPRUCE BUDWORM SPRAY PROGRAMME

Recommendation I: The setback zone for small fixed wing and helicopter spraying must be increased from 1,000 feet to (at the very least) one mile from human habitation.

Rationale: The Spitzer Task Force on Cancer and the Environment has stated that fenitrothion has not undergone the accepted toxicological protocols critical to establishing its risk potential. As importantly, no acceptable chronic studies have been conducted on "non-active" ingredients. The C.C.N.B. insists that synthetic chemicals should not be used in the environment until acceptable toxicological evaluations have been completed on all spray formulations to be used and on each component within a spray formulation, especially where involuntary exposure is possible. However, the C.C.N.B. feels that the political climate today precludes the implementation of such a recommendation. Therefore, it openly acknowledges a compromise solution involving a one mile setback which will maximize the protection of human health.

Recommendation II: The annual spruce budworm spray programme must be subjected to a thorough environmental impact assessment by an independent multi-disciplined board. The terms of reference of the board must allow for a detailed analysis of the economic, social health and environmental impacts of the activity and the reasonable alternatives thereto.

Rationale: The goal of a proper environmental impact assessment is to develop a dynamic forest management policy which maximizes the economic potential of the forests while minimizing the potential for harm to human health and the ecosystem. A great deal of information

relevant to such an assessment has already been generated and must not be reproduced. Nevertheless, a thorough assessment must be completed before rational decisions can be made respecting the protection of our forests.

Recommendation III: Solvents containing fractions of fossil fuel oils should not be sprayed into the environment under any circumstances. The Spitzer Task Force on the Environment and Reye's Syndrome and the Spitzer Task Force on Cancer and the Environment both expressed their concern about the dispersal of fossil fuel oils into the environment. Indeed, recommendation III is a verbatim quote from the Reye's Syndrome Task Force. When asked during the public hearings of the Reye's Syndrome Task Force about whether or not any qualifiers were placed on this recommendation, Doctor Spitzer answered in the negative.

Recommendation IV: Section 76 of the Crown Lands and Forests Act, R.S.N.B. 1973, c. C-38.1 must be repealed.

Rationale: The common law rights associated with an action in trespass and nuisance have developed over the centuries to provide private individuals with an acceptable remedy for interferences with the use or enjoyment of their lands. Historically, there was never any need to establish actual injury to person or actual damage to property in order to found a remedy in private nuisance or trespass. By the stroke of a pen, the provincial Government in 1978 effectively took away these common law rights. This situation is critical with respect to a trespass or a nuisance caused by a spray formulation because it is usually impossible to show actual injury to person or actual damage to property until years after the event. Section 76 is an unacceptable and unnecessary infringement upon the common law rights of the general public within the

province as they have been developed over the course of centuries.

II. HERBICIDE PROGRAMME

Recommendation I: All herbicides dispersed into the environment must first be subjected to accepted toxicological evaluations. Both the formulation and each chemical component must undergo assessment.

Recommendation II: The Notice under the Pesticides Control Act, dated March 5, 1980 (Vol. 138, Royal Gazette) exempting certain people from the application of section 16 of the Act must be amended to ensure that all people involved with the sale, purchase and application of pesticides for forest management purposes are subject to the full rigor of the Pesticides Control Act.

III. THE USE OF PESTICIDES IN AGRICULTURE

Recommendation I: It is imperative that the Department of the Environment (perhaps in collaboration with the Department of Agriculture) commence an intensive programme to educate farmers as to the wise use of pesticides for agricultural purposes and the potential dangers associated with misuse.

Rationale: The C.C.N.B. has consistently stated its concern about the magnitude of the use of agricultural pesticides and their potential adverse human health impacts. The paucity of information concerning agricultural pesticide use underscores the need for immediate involvement of the government in regulating the use of these pesticides. It must be stressed that the C.C.N.B. is not attempting to impose yet another series of regulations onto farmers. Indeed, it is

suggested that the government work closely with various farming organizations to establish equitable protocols to ensure as far as practicable the safety of farmers and consumers alike. The C.C.N.B. feels strongly that this process would be in the best interests of the farmers as well as the general public.

In several previous briefs to the Pesticides Advisory Board, the Conservation Council has expressed concern about the large amounts of pesticides used in agriculture in this province, and about the apparent disregard of regulations for proper disposal of used pesticide containers and residues, and the failure of applicators to wear proper protective equipment. We feel that farmers are still putting themselves and their neighbours at unnecessary risk from dangerous chemicals, and recommend that the government introduce more effective regulatory action to reduce these risks.

Even though there are indications that protective clothing alone may not be adequate when exposure to vapours is involved, regulations requiring the use of protective clothing for people exposed to pesticides should be rigourously enforced. In order to make this protective gear more readily available to farmers, pesticide vendors should be required to sell safety equipment, and to display it prominently beside the pesticides.

A recent survey conducted by the Department of the Environment in a small area of the "potato belt" came to several disturbing conclusions about the degree of exposure of farmers to pesticides.

This survey[1] identified a number of immediate concerns regarding pesticide use practices. These included careless sprayer filling techniques, improper pesticide

container disposal, failure to wear adequate personal protective equipment, and an overall lack of concern among users regarding the risks of personal exposure to pesticide chemicals or environmental impacts related to their use.

Many of these problems are a result of a failure by individual farmers to understand the need for caution when handling and using pesticides. For example, product labels authorized by the Federal Pest Control Products Act clearly outline restrictions concerning use and mixing near watercourses, proper container disposal procedures, and use of proper personal protective equipment.

However, the survey results indicate that a large majority of farmers are disregarding this label information which is a direct contravention of the Federal Pest Control Products Act. Since 1963, many cases of environmental damage (i.e., fish kills) resulting from agricultural pesticide misuse have been reported to and documented by federal fisheries officers (NBDOE, 1976).

The recent survey provides clear evidence that individual applications of agricultural pesticides on private land and subsequent container disposal practices are not subject to effective regulatory action at the present time.

Farmers are probably not the only segment of the population exposed to unnecessary risks from pesticides. Home gardeners are prone to over-use pesticides. In addition, the containers of pesticides readily available to consumers on the shelves of garden supply stores or

[1] A Survey of Pesticide Use Practices in a small agricultural watershed of New Brunswick. The N.B. Department of the Environment, Feb. 1982.

chains such as K-Mart are far too large. This not only encourages over-use of the product, but creates problems of disposal and/or storage in homes.

In the past, surveillance of pesticide applications seems to have been confined mainly to forestry-related operations. In view of the size of the problem, far more attention should be given to agricultural use (and misuse) of pesticides than has been given to date.

In addition, all agricultural pesticides suspected of carcinogenicity should be banned.

In view of evidence collected by E. Bartel (Increased Risk of Lung Cancer in pesticide-exposed male agricultural workers. E. Bartel, 1981. Journal of Toxicology and Environmental Health 8: 1027-1036) herbicides containing amitrole, phenoxy herbicides and chlorophenols can lead to an increased incidence of tumours, and should therefore not be allowed in agriculture. In a cohort study of 1628 German agricultural workers, the mortality rate was twice that of the rest of the population in workers exposed to the above pesticides. The amount of exposure and length of time employed had a significant effect on the occurrence of soft-tissue sarcomas and malignant lymphomas.

IV. GENERALLY

Recommendation I: The Department of the Environment should seek legal advice when deciding whether or not to prosecute for breaches of the Pesticides Control Act.

Rationale: On a number of occasions the Department of the Environment has concluded that a prosecution under the Pesticides Control Act is not warranted because

the Department could not establish a cause for a breach of the Act; that is, the Department felt that the breach was not intentional. However, R. v. Sault Ste. Marie, (1978) 2 SCR 1299 makes it clear that with most environmental legislation the prosecution need only prove the act of the breach. The onus then shifts onto the defendant to establish on a balance of probabilities that the breach was not caused as a result of the negligence of the defendant.